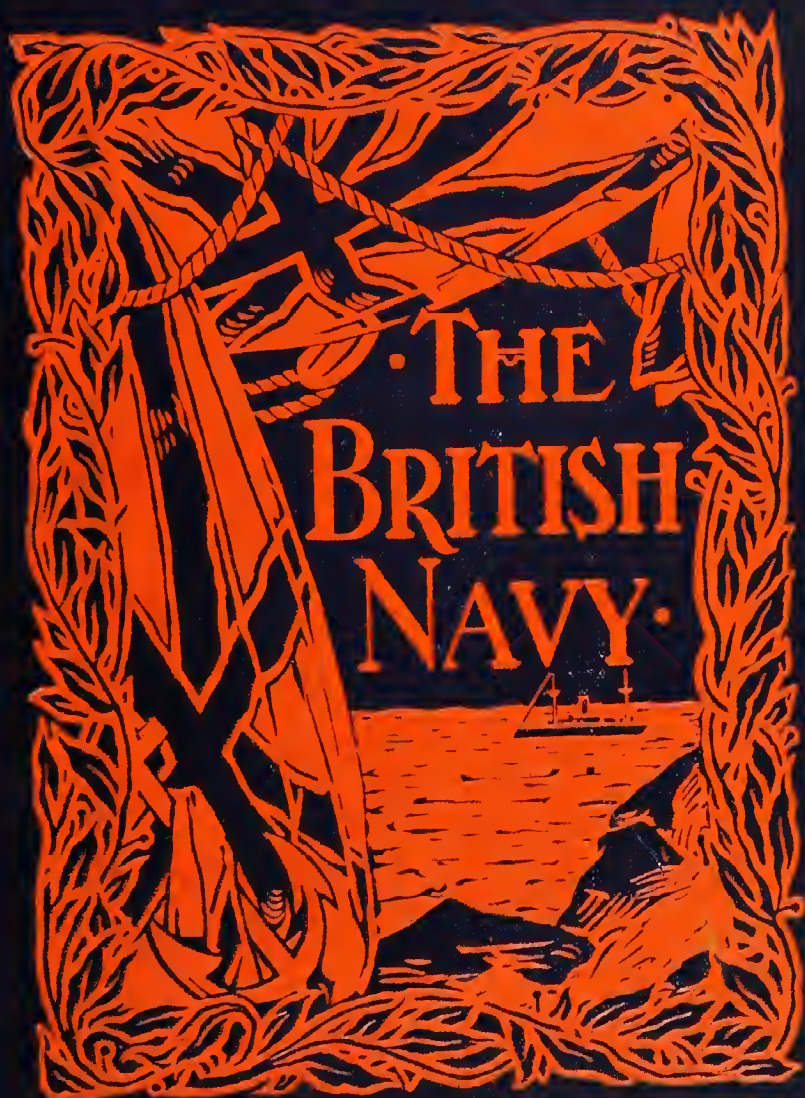




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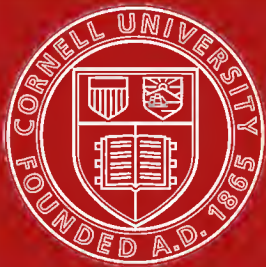
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THE BRITISH NAVY

BY A. STENZEL

CAPTAIN IMPERIAL GERMAN NAVY, RETIRED.

"He that rules the sea, rules the commerce of the world,
and to him that rules the commerce of the world belong
all the treasures of the world and indeed the world itself."

[Sir Walter Raleigh.]

WITH ILLUSTRATIONS, MAPS AND DIAGRAMS.



LONDON
T. FISHER UNWIN
PATERNOSTER SQUARE

1898

Printed in Germany.



TRANSLATOR'S PREFACE.

The fall of the first Napoleon in 1815 was succeeded by a feverish peace of 33 years. This led on to the events of 1848, when the unrest of nations, caused by cravings for political and individual liberty and by nationalistic aspiration, found expression in rebellion, revolution, and war. Ambitious men exploited the popular passions for their own advantage, and the series of events of this last half-century has been changing the political map of Europe almost beyond recognition. No doubt, many of the changes have proved highly beneficial to mankind. Who can fail to be gratified in contemplating Germany united, and freed from the nightmare of the dictatorial and overbearing preponderance of France and from foreign interference generally in her internal affairs? Or Italy! now mistress of her own fate; her soil free from the detested rule of the foreigner; and the ardent desire for unity cherished for centuries by her noblest patriots, but believed to be no more than a pious aspiration, a realised and concrete fact. These are great gains, not too dearly purchased by five great wars. Would however that that were the whole price! More, much more had to be paid; European Right has been superseded by European Might, and we stand in the midst of an armed peace, which at any moment may terminate in an outbreak of universal conflict. Education has raised the intelligence of the rank and file of the combatants, and Science has more than doubled the destructive power of war. And as if these causes of mischief were not enough, trade jealousies and commercial rivalries have lately been added to intensify popular passions and to stifle the small voice within the hearts of men, pleading for justice and truth between nations as between individuals. If the expected struggle is not warded off by wise statesmanship, some nations like Russia will fight for mere aggrandisement, whilst

others like England and Germany will feel their very existence to be at stake.

In such circumstances it behoves wise men to take stock of the forces surrounding them, and of the resources possessed by possible friends and foes. The time is ripe for the publication of works such as the present series, of which the volume before the reader forms the first part; it may aid in forming public opinion and in guiding its action.

To see ourselves as others see us is often a salutary discipline, and tends to tone down the self-congratulation in which most of us are prone to indulge. Well, Englishmen may here behold their navy as it presents itself to the mind of a highly competent foreign critic, who has made the English Navy a special object of his professional study, and they will have ample cause for gratification. Not that he deals out indiscriminate praise, far from it; he does not shrink from putting his finger on what seem to him sore points, nor from dwelling on past errors and shortcomings; but the sum total of his investigations amounts to an ungrudging recognition of that maritime preponderance which is essential to England's existence. His concluding words are: "Owing to the inexhaustible resources at the disposal of the country, the new fleet is being created in an incredibly short time, A POLITICAL INSTRUMENT OF ENORMOUS POWER. May English policy employ it with justice, wisdom, and moderation!" Every Englishman will heartily echo these words.

To naval officers and others conversant with naval affairs, it is hoped that the translation of Captain Stenzel's book will be interesting as a sympathetic view of the English navy through German spectacles. English people not specially conversant with naval affairs will find in it not only a tribute to the greatness of their greatest institution, the safeguard of their very national existence, but a fund of information on naval subjects in a popular form such as "no single English work has yet afforded them". All the information has been brought up to date by means of reference to the latest sources, and every effort has been made to render the work as accurate as a work of reference should be.

For aid in the translation of many technical terms, my thanks are due to Mr. F. W. Crohn of the firm of Messrs. Yarrow and Co., Poplar. I have also been greatly assisted by Mr. F. Harrison Smith R. N., who has devoted his extensive knowledge to a scrutiny of my manuscript and the proof-sheets. It is almost impossible for

a foreigner to avoid some errors or misapprehensions in composing such a work as that of Captain Stenzel, and on such a subject as the British Navy. It would be equally impossible, except for one who combined a thorough mastery of German and English with a technical knowledge of naval affairs, to avoid some additional errors in the course of translation. In the elucidation of the author's misapprehensions and in the elimination of the translator's mistakes, Mr. Harrison Smith's help has proved most useful and all but indispensable.

In writing for German readers Captain Stenzel has necessarily introduced expressions which must be explained to an English reader. He draws a distinction between Officer (Offizier) and Official (Beamte): the latter denotes the medical officers, paymasters, &c.; in a word, non-combatants, who are not called by the name of Officer in German. Indeed there is an important difference in the German Navy between the two classes. The officers, like the crews, take an oath of allegiance to the Emperor solely, the officials are sworn to the Imperial Constitution as well as to the Emperor.

It has been thought best in a few instances to retain the German terms, but this and a small number of similar cases must be left to the discrimination of the reader.

One more word on an innovation I have ventured to introduce with respect to the use of small capitals in the body of the text. Occasionally emphasis is aimed at, but generally the intention is to aid the reader in referring from the index to the subject indicated.

A. SONNENSCHN. E.

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THE BRITISH NAVY.

I. INTRODUCTION.

a. Sea Power.

England's fate has always depended on her command over the seas that wash her shores. As long as these were kept safe by a strong and well organized Navy, the country had nothing to fear from foreign foes and was able steadily to develop its resources undisturbed by the wars that distracted the European continent; but whenever this protection failed, foreign conquerors grievously injured and sometimes even subjugated the nation; or pretenders overthrew the reigning dynasty and usurped the throne.

From of old, English Kings have claimed the rule over the waters of the "Narrow Seas," i. e. the sea on both sides of the Straits of Dover, where the "Silver Streak," that separates England from the continent is narrowest. Subsequently even John Lackland in the beginning of the 13th century, and later still, after the defeat of the Armada, the English Kings claimed the supremacy of the "British Seas," a term which included all the waters from the Farøe Isles to Finisterre in the one direction, and from the western coast of Norway and Denmark to far out into the Atlantic in the other.

In spite of Sir Walter Raleigh's memorable dictum: "He that rules the sea, rules the commerce of the world, and to him that rules the commerce of the world belong all the treasures of the world and indeed the world itself," the rulers of England did not comprehend the TRUE IMPORTANCE TO ENGLAND OF THE MASTERY OVER THE SEA till the second half of the 17th century; but from that time forward it has been the leading maxim of English statesmen to maintain this

power, and thus to retain in their own hands the maritime trade and the wealth it brings.

But by that time England's sea-power had already expanded beyond the limits of the "British seas;" the colonization of America and the acquisition of Jamaica in 1655 having laid the foundation of the huge Colonial Empire of our days. As this Empire expanded, so also English predominance at sea had to expand. This was the gigantic task imposed on the English Navy and it always has discharged it and is discharging it still. The grandeur and safety of the British "World-Empire" rests primarily on her FLEET.

b. In Remote Times.

The warlike deeds of the English Navies reach back to the early Middle-Ages. The early Keltic inhabitants of the country certainly were not a seafaring people; they never opposed on the water the repeated landings of Roman Armies from Gaul, first under Cæsar 55 and 54 B. C., and subsequently after 43 A. D. when the Romans actually conquered the country. After the departure of the Romans, the Anglo-Saxons coming from northern Germany landed in 449 without difficulty and soon made themselves masters of the country; but although they were exceptionally skilful in maritime affairs, yet once in possession of the fertile country, they abandoned all warlike enterprise at sea and devoted themselves eagerly to maritime trade, which brought them an abundant harvest.

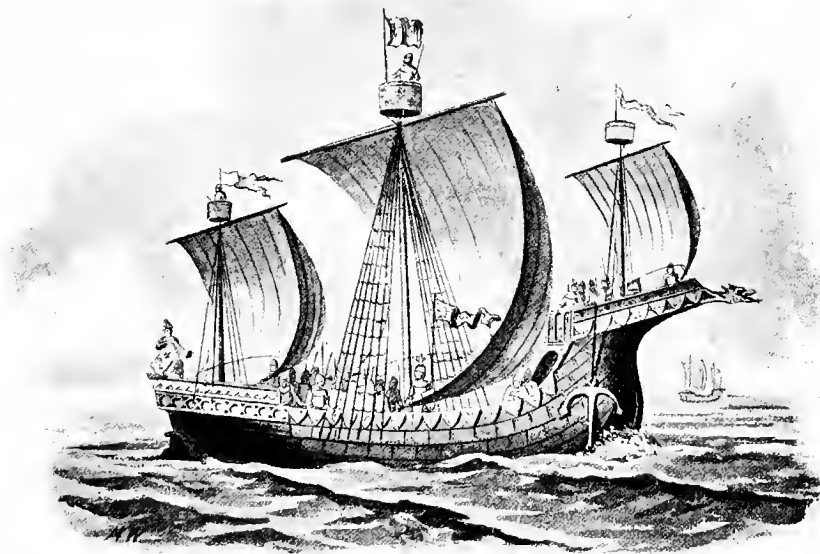
c. The Middle Ages.

Owing to this fact the Northmen, who during Charlemagne's lifetime were kept in check by that great ruler's maritime power, were able after his death to extend their ravages at sea as far as the coasts of England, which they visited year by year, till at last they even effected a permanent settlement in the north. Not till the time of Alfred the Great did the English meet these foes victoriously first on land and afterwards on the water; Alfred being the first of England's kings, who was Commander-in-Chief of the navy. In 897 he had a new kind of war-ships built according to his own designs, which were superior to those of the Northmen, and which may be regarded as the FIRST ENGLISH FLEET.

His successors kept up their power at sea and thus were able for about a century to ward off the continual piratical inroads of the

Northmen; but under the rule of feeble Ethelred, the *Danes* resumed those aggressions and even subjugated the nation for a time. Afterwards indeed, Saxon Kings regained the throne, but in 1066 Harold, the last of this race, succumbed to the simultaneous attacks of the Northmen in the north-east and of the Normans in the south.

To meet the expedition fitted out against England by Duke William of Normandy, Harold had collected a large fleet in the Downs; this however was inadequately organized. When autumn came, pro-



The ship in which William the Conqueror crossed over to England 1066 A.D.

visions had run out, and when moreover an army of Northmen had landed in the north, the fleet dispersed, and thus Duke William was enabled on the 27/28th September to cross over unopposed with an army of 60,000 men and a fleet of many hundred ships, from St. Valery to Pevensey near Beachy Head, where he landed in safety, whilst King Harold was busy in the north defeating the King of Norway, being himself wounded in the fight. In the battle of Hastings following thereupon, on the 14th of October 1066, the Saxon army was defeated by their vastly superior enemy; Harold was slain and William "the Conqueror" assumed the Crown of England.

By introducing the Feudal System he created the great territorial power of the English nobles, who formed an influential class standing between the Sovereign and the People and exercised a deep-reaching influence on the political institutions of the country no less than on its Navy. Then were appointed guardians of the ancient five havens of Saxon times, the "Wardens of the Cinque Ports," Dover, Romney, Hythe, Hastings, Sandwich. These towns were bound to provide a number of vessels for warlike purposes for a fixed period, and in return had valuable privileges conceded to them. This may be regarded as THE COMMENCEMENT OF A DEFINITE ORGANIZATION OF ENGLAND'S POWER AT SEA. William the Conqueror however did not maintain a standing navy, and indeed he is said to have burned his ships behind him when he landed. Thus it happened that he was unable to beat off hostile inroads from the sea and in the year 1069 he had even to buy off the Danish king Swain who had effected a landing in great force.

His successors also restricted themselves to creating naval armaments solely for special occasions, pre-eminently Richard Cœur de Lion in 1189/90 for his crusade to Palestine. Although the Norman barons despised trade, it nevertheless thrived under their rule; the Saxons, who had been dispossessed of their land, cultivating commerce with great success.

The next maritime measure of *permanent* importance was the creation of the naval port of Portsmouth by King John in the year 1212, as this supplied the Navy with a strong base of operations in the Channel. The following year witnessed the first battle between an English and a French fleet at Damme in Flanders, where the French fleet, feebly armed, was riding at anchor and was completely destroyed. A few years later in 1217 the first battle on the open sea between the two nations was fought at Dover. A French fleet was sailing with a favourable wind from Calais to the mouth of the Thames, intending to bring help to the Dauphin, who had been called over to England by insurgent barons. Hubert de Burgh, the commandant of Dover, met and totally defeated them with a squadron from the Cinque Ports, which had been hastily collected and manned with skilful sailors and archers; this victory saved the throne of Henry III., who was only ten years of age. In this battle the English employed for the first time, and with telling effect, the manœuvre to which they subsequently adhered down to the end of the period of

navigating ships with sails, viz: to obtain the weather-gage and then to attack the enemy from to windward.

For centuries afterwards the ships of the Cinque Ports constituted the main part of the war fleets of the English kings; at times they even waged war on their own account, and committed piracy according to the usage of those days. On the ownerless domain of the seas, the protection now-a-days afforded to merchantmen by the national flag, was acknowledged only if force was actually at hand or very near; *all* ships were therefore armed and prepared for battle. There was at that time no difference between merchantmen and men of war, such as existed in ancient times with vessels propelled by oars; it was not till the 16th century that this distinction gradually came into use. But even in the beginning of this 19th century armed East-Indiamen fought successfully in actual battle-array.

The number of royal vessels was under those circumstances small both in England and in foreign countries; even Henry V., warlike and enterprising as he was, possessed in 1417 no more than 3 large and 17 small vessels. When a great expedition at sea was being organized, the ships of the Cinque Ports and other harbours were called up and even seized in the king's name. By these means vigorous princes occasionally assembled large fleets, as, for example, Edward III. in 1340, when in the sanguinary battle of Sluys he totally destroyed the French navy riding at anchor; only a few mercenary ships of Genoese galleys succeeded in effecting their escape by means of oars. This victory frustrated the plan of Philip VI. to land an army in England. Edward III., who now openly assumed the title of "Lord of the Narrow Seas", carried the war into France, so that the naval victory of Sluys became the harbinger of the victories on land, of Cressy in 1346 and of Poitiers in 1356.

Between these two dates the king achieved a deed of arms at sea, which is characteristic of him and of his times. Accompanied by the Black Prince and a brilliant retinue he lay at Winchelsea west of Dungeness with a powerful squadron in wait for a fleet of 40 large Spanish vessels, which in the midst of peace, had captured some English ships, and now laden with rich booty were returning home from Sluys through the "Narrow Seas." At their approach he unhesitatingly attacked them, ramming them under full sail, bow to bow. His own ship and that of the Black Prince were so severely damaged that they both sank along with the enemy's ships that had

been boarded and captured; nevertheless he remained conqueror, the Spaniards having lost more than half their fleet.

In such manner did vigorous rulers assemble mighty fleets from time to time and perform glorious achievements at sea; but from want of system in the operations, gain and loss frequently alternated. Not unfrequently the English were foiled at sea, and even landings on their coasts were no rarity; for example, during the reign of Edward III. himself, Portsmouth and Southampton were burnt and sacked, and in 1372 an English fleet before La Rochelle was defeated and captured by the Spaniards. Under feeble kings like Richard II. and Henry VI. England's power at sea wholly decayed, so that in 1395 Danish pirates were able to lay waste the eastern coast, commit ravages, and levy contributions on the towns. In consequence of this neglect Henry of Lancaster in 1399 found no difficulty in sailing with eight small vessels from Boulogne past the mouth of the Thames, to a place north of Hull, where he landed and afterwards dispossessed Richard II. Similarly in 1485, Henry Tudor sailed with a larger squadron from Harfleur at the mouth of the Seine to Milford Haven in Wales.

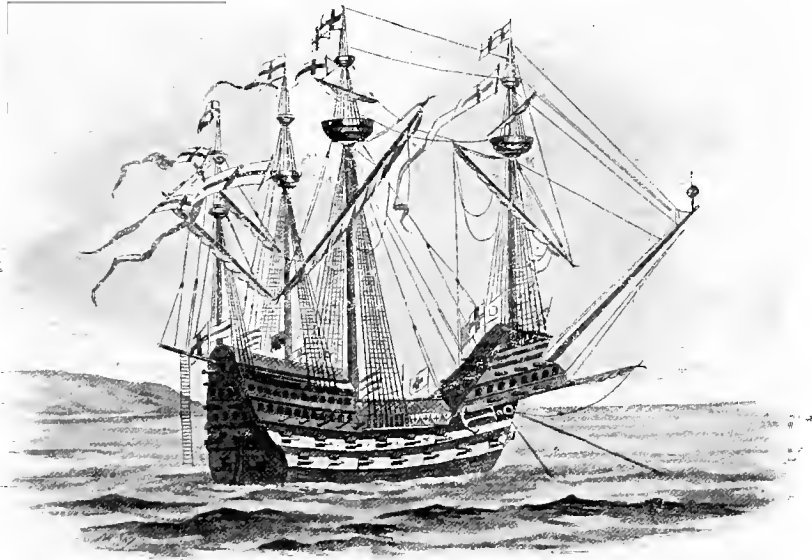
d. Modern Times.

In this same year 1485 Henry Tudor won the battle of Bosworth Field, where Richard III. lost throne and life. Henry VII. took measures to prevent others from following the example he had set them, by making his country powerful at sea. In 1488 he had built the "Henry Grace à Dieu," an especially large, veritable man-of-war, which may be regarded as the beginning, the first ship in point of time, of the ENGLISH ROYAL NAVY. His son, Henry VIII. continuing his father's policy, organized the navy and in 1520 appointed a supreme central authority, the Admiralty, whose chief was the Lord High Admiral. Subordinate to the Admiralty was the Navy Board, which was to superintend the non-combatant branches of the service, such as the construction and armament of ships, the victualling &c. He also laid the foundation of a permanent BODY OF OFFICERS OF THE FLEET and moreover fully organized "Trinity House", which has ever since had charge of maritime affairs, such as the appointment of skippers, pilots, lighthouses, beacons, buoys and so on.

Under such intelligent guidance and control, navigation and commerce, which had been wholly prostrated, quickly revived and flourished to such a degree, that even the war which France and Spain

carried on by means of privateers after Henry's excommunication, did more harm to England's foes than to herself; moreover Henry fostered the warlike qualities of English seamen and promoted the building, and improved the rigging, of vessels of every kind.

The government of Edward VI., a minor, and of Mary, a Catholic, was not favourable to maritime affairs; but these developed and expanded all the more under the rule of the great Queen Elizabeth. The Reformation had roused the intelligence of men, and the discovery of a sea-route to India, and of America, had mightily stim-



Henry Grace à Dieu of the time of Henry VIII.

ulated the spirit of enterprise. England took an eager part, devoting herself to discoveries and to opposing the trade-monopolies established by Spain-Portugal on both sides of the ocean for their own exclusive advantage.

A galaxy of great men gained distinction in these pursuits, such as Davis, Frobisher, Hawkins and others, but pre-eminently Drake and Raleigh, who towered high above their contemporaries. Voyages of discovery were made into the northern Polar seas, and the east coast of America, where the first trans-oceanic settlements were made in regions which now form part of the UNITED STATES. On the other hand, an active contraband trade was carried on in the trans-oceanic

possessions of Spain, which speedily led to deeds of violence and cruelty on the part of the Spaniards, and to piratical expeditions on a large scale by the English, supported by their Queen against the harbours and colonies of Spain. Foremost amongst these ventures, stand the expedition under Drake to the west coast of America and his circumnavigation of the globe in 1577—84, the first after that of Magelhan;¹ and in 1587 the expedition to Cadiz, where the English destroyed the greater part of the fleet that was being prepared against them.

To avenge this insult Philip II. in 1588 fitted out his "Invincible Armada," which was to have brought over from the Netherlands the Spanish army under the Duke of Parma. Against this mighty armament England could oppose only the Royal Navy of 34 vessels, whose total tonnage amounted to 12,320 tons, hardly more than that of a single English battleship of modern days; only 13 vessels had a tonnage of 500 tons or more; and 12 measured less than 100 tons. To these were added about five times as many merchantmen and other vessels, all armed but mostly of small size; they were sent by the commercial ports partly on requisition and partly as volunteers. The victory, which was gained not by the tempest,² but by the English fleet, in a battle of several days' duration, in a running fight from Plymouth to Gravelines, was due to the superiority of English arms and of English seamanship in sailing and manœuvring, as well as to the skilful use made of these advantages by clearsighted commanders such as Drake, Hawkins, and others; they introduced a new mode of fighting and engaged the enemy in an artillery combat at long range from the weather position; a manœuvre which required men of skill and daring such as they had under their command.

This extraordinary success marks a turning-point in the history of the world, but not in that of the English navy. Drake and Raleigh failed to convince the queen of the great importance of dominion over the sea, and her excessive parsimony prevented the creation and maintenance of a great navy. At her death the whole fleet amounted to only 16,000 tons measurement, or about 24,000 tons displacement.

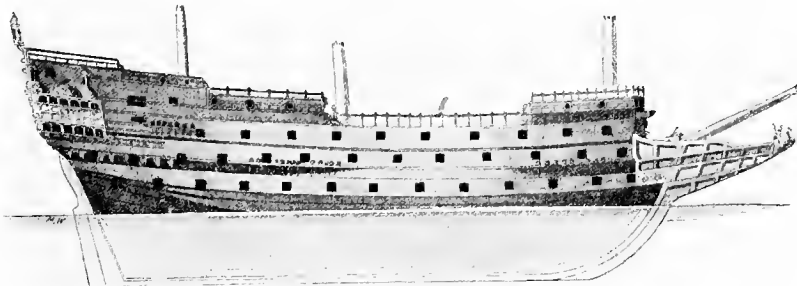
During the reign of her successor, the feeble James I. (1603—25), the navy, which the king neither understood nor cared for, found

¹ Nearly 60 years previously, Magelhan himself lost his life in that voyage.
The translator.

² As commemorated by the medal bearing the modest legend: "Deus afflavit et dissipati sunt."
The translator.

little employment either in war or other pursuits. Some little progress indeed was made in organization and in some technicalities; for example, the men-of-war were formed into 6 classes, an arrangement, which remained in force to the end of sailing days; but great abuses soon crept into the administration, money was squandered and posts were filled by favourites; wretched food and bad treatment of the men rendered the service highly unpopular. In consequence, the navy fell into such rapid decay that the English seas were made unsafe by Moorish pirates and Dunquerque privateers, who even pillaged English ports. The ruin of navigation was followed by rapid deterioration of English seamanship, which had but lately attained such great eminence.

Charles I. (1625—49), the ill-advised son of James I., took a lively interest in the navy, but could effect very little improvement, being unable to check the abuses which had become inveterate. The expeditions fitted out by him in the commencement of his reign, against France and Spain, entirely failed, owing to the want of skill of the commanders; to deficient equipment, and bad discipline. Being constantly in want of money and under the pressing necessity of increasing the supplies to the navy, he had recourse in 1634 to levying the ill-omened "Ship-money," on his own authority, without the consent of Parliament. With the amounts thus raised Phineas Pett, his naval architect, built a number of ships, amongst them the "Sovereign of the Seas" the first three-decker. During this reign were also built the early forerunners of the corvettes and frigates of later days. But the political troubles of the country were intensified by the levying of ship-money and by other measures of the king, so that civil war broke out, terminating in the king's imprisonment and execution.



"Sovereign of the Seas," the first Three-decker of the English navy of 1637 tons measurement; and 102 guns, built 1636—37 under Charles I. by Phineas Pett.

During the civil war the navy remained neutral as long as possible, but finally the fleet as well as all the ports sided with the Parliament. After the imprisonment of Charles I. a mutiny broke out and part of the fleet passed over to the Prince of Wales, who had taken refuge in Holland. With these vessels the German Princes, Rupert and Maurice of the Palatinate, undertook an audacious naval expedition against English shipping, first to the Scilly Isles, and then to Kinsale in Ireland. Driven thence by Cromwell and Blake, they were afterwards blockaded by the latter, first in Lisbon, and then in Toulon. Expelled at Blake's request from this latter port they turned freebooters and sailed to the West Indies, where Prince Maurice perished in a hurricane. Prince Rupert, after whom is named Rupert's Bay in the island of Dominica, had to abandon this life after a while, and returned to Europe. There he found opportunity to utilize on a large scale his experience in maritime warfare.

e. Commencement of the Glorious Days of the Navy.

Since the king's imprisonment the navy had become wholly disorganized, all the old abuses having remained in full force, but after Charles's execution Cromwell reorganized it in a manner similar to that adopted in the army four years previously. In February 1649 three colonels of the army who had distinguished themselves in the field, were appointed as "*Generals and Admirals at Sea*," and as "*Commissaries of the Navy*," and were entrusted with the chief command and with the administration of the navy. The soul of that Commission was ROBERT BLAKE, Cromwell's greatest and most dreaded rival, whom by this appointment he removed from the army, and from the country.

The reorganisation was effected rapidly, but thoroughly and skillfully. After only two months Blake was able to go on board, and it was for the first time in his life. He was then 50 years old and set out in command of a powerful squadron to reduce Prince Rupert. This he did most effectually, as has already been told above, and afterwards he sailed into the Mediterranean, being the first English admiral that had done so since the times of the Crusades. Subsequently he took the Scilly Isles and the Channel Isles, which were still held by the Royalists, on which occasion he for the first time attacked land batteries with ships. He swept the English seas clear of all foes. By his bold and very effective actions against the Royalists as well as against Portugal, Spain, France, and the Barbary

States, the English flag, for some decades previously held in low estimation, was made to inspire dread and respect, and with him began THE GLORIOUS DAYS OF THE ENGLISH NAVY in connection with the profound and far-seeing policy inaugurated by Cromwell, which laid the foundation of the "Greater Britain" of our days.

The Lord Protector clearly saw that England's safety and pros-



Robert Blake
General and Admiral.

perity depended mainly on her power at sea, which entailed the necessity of constantly keeping up a mighty navy requiring a large and regular revenue; and that this could not be raised except with an extensive and lucrative maritime commerce, which in its turn demanded effective protection both in home and foreign waters. The widest scope had therefore to be secured to British trade by the abolition of all trade-hampering monopolies, by the conclusion of favourable

commercial treaties, and by exclusion, or at least the utmost possible restriction, of foreign competition.

The United Provinces of Holland had entered into a dangerous rivalry with England. Even during their forty-years' War-of-Independence against Spain they had begun to develop into a mighty Power at Sea by carrying on maritime trade and fishery on a large scale and in a bold spirit of enterprise, and true to the spirit of the times they protected their commercial navy by a powerful war-navy. The decay of the Spanish maritime forces, the weakness of France at sea, and the incapacity of the English fleet under James I. and Charles I. added to the rise of eminent Dutch Admirals, such as Peter Heyn and Tromp the Elder, all contributed to the prosperity of Holland and her expansion beyond the seas. In consequence of this, about the middle of the 17th. century, the small Dutch Republic held the foremost position in commerce, sea-power, and colonial expansion; indeed it did not shrink from acting in the colonies in a spirit hostile to England. Cromwell made it his task to repress it.

The first step he took was to pass the Navigation Act in 1651, forbidding that any goods should be imported into England except either in English ships, or in ships of the country where the goods were produced, provided always that these foreign vessels visited no intermediate port, but came straight to England, thereby maiming the Carrying trade of the Dutch and indeed almost wholly shutting out their flag. Next, the English government issued letters of marque doing further great damage to the trade of Holland, and at last, on the 29th of May 1652, open hostilities broke out, when Blake in command of an English squadron attacked a Dutch fleet under Tromp off Dover, because the latter refused to comply with the English demand to strike his flag in the "Narrow Seas." This was the beginning of the FIRST of the THREE ANGLO-DUTCH WARS of the 17th century; wars characterised as being caused solely by commercial considerations, and as being fought out exclusively at sea. It was the FIRST REAL MARITIME WAR of modern days.

The English under Blake, Monk, Ascue, and others, fought with a valour and obstinacy equal to that of the Dutch under Tromp the Elder, de With, Ruyter, and others. Within 15 months no less than 8 battles were fought, all except one in the Channel or in the Hoofden.¹ Victory alternated; now the Dutch won, then the Eng-

¹ The part of the North Sea, west of Holland (see map). The translator.

lish. In the winter of 1652/53 Tromp for a time was master of the Channel, but the final result was unfavourable to Holland. The "Seven United Provinces" lacked a strong central power with undivided responsibility, to fit out a fleet that should be adequate to the work in hand, and commanded by competent officers animated by a common spirit; they mostly employed armed merchantmen and even their regular men-of-war were no match for the English either in size, strength of structure, or armament. On the other hand also, the unfavourable geographical position of Holland compelled Dutch merchantmen making for the Atlantic, either to sail along the enemy's coast, near or at no great distance from it, through the Straits of Dover and along the whole of the south coast of England, or else to take the long, difficult and circuitous course round the north of Great Britain. Even the fishing grounds of the Dutch were nearer to the enemy's shores than to their own.

In the long run the Dutch were no match for the superior English fleet with which Cromwell opposed them consistently in every direction. In the course of the war some 1700 Dutch merchantmen were captured, trade and fishing, on which the whole prosperity of the country depended were paralyzed, and the wealthy ports became desolate. Thus the small Republic was compelled in 1654 in the "Peace of London" to submit to the Navigation Act, and to acknowledge English supremacy in the "British Seas."

Hardly had this dangerous rival been humbled, when Blake, although ill with scurvy, set out on an expedition into the Mediterranean spreading the terror of the English flag by making reprisals against Naples, Tuscany, the Pope, Malta, the Deys of Tripoli, Algiers, and subsequently also of Saleh. He destroyed the fleet of Tunis within the port of the capital, though protected by strong batteries; then he blockaded Cadiz, so as to put an end to the Spanish trade-monopoly. One Plate-fleet he captured; another he destroyed under the very forts of Santa Cruz de Teneriffe. During these operations, which lasted nearly three years, scurvy made ever greater inroads on Blake's constitution, and this great commander breathed his last on his homeward voyage on the 17th of August 1654, within sight of Plymouth, on board his flagship "St. George."

Meanwhile Admiral Penn, who had been despatched to the West Indies, had taken Jamaica from the Spaniards. This island was after Guiana, which had been taken possession of in 1652, the first great English Colony within the Tropics. Nova Scotia, the Bermudas, and

some of the Lesser Antilles had already been colonized in the first half of the century.

After the RESTORATION maladministration resumed its sway and affected also the navy, although the king's brother, the Duke of York, in his capacity of Lord High Admiral, took a deep interest in its welfare. Mammon was predominant and Charles II. sold to France that Dunquerque which Cromwell had won, and which was so necessary to the command of the "Narrow Seas." Charles however continued Cromwell's policy towards HOLLAND, whose maritime trade had recovered with surprising rapidity, so that it exceeded the English trade several times over. Trade-jealousy then again kindled war, the SECOND ANGLO-DUTCH WAR, which also was a purely maritime contest and in the main was fought out in the Hoofden. War was declared in February 1665, English squadrons having already in the previous year made the ominous capture of the prosperous Dutch colony of New Amsterdam in North America, the modern New York, and of some other settlements, besides some Dutch commercial fleets.

The fleets of both the nations had been largely reinforced during the last 12 years; in the first battle of Lowestoft on the 13th of June 1665, each numbered upwards of 100 sail. In numbers the English superiority was not very great, but their ships were mostly larger, more solidly built, and better armed; moreover the *esprit de corps* of the English officers told heavily in their favour, an advantage which the Dutch, in spite of all organising efforts, failed to secure. Charles I. divided the English navy into three Squadrons; the Red (being the Centre), the White (the Van) and the Blue (the Rear), and the admirals and their vessels hoisted the corresponding flags. This arrangement, which also determined the rank of the admirals, remained in force till about 30 years ago.

The fighting instructions dating from Blake's times (1655) were on this occasion observed for the first time as an invariable battle-array, viz: "CLOSE HAULED." This prevailed down to the time of Nelson.

The English, whose van was led by Prince Rupert under the command of the Duke of York, gained the victory. The Dutch Admiral de With and his ship were blown up, and English fire-ships, which at that battle formed an important integral part of the fleets for the first time, did great damage to the Dutch.

In the following year the English were defeated by the famous Admiral de Ruyter in a second battle of four days' duration; but within two months on August the 4th 1666, they turned the scales

completely in their favour. But when Charles II. from want of money, determined to omit fitting out the greater part of his ships of the line, and to restrict himself to the lucrative war by privateers, de Ruyter in the month of June 1667, sailed with a large fleet up the Thames, took Sheerness and its maritime stores, and even seized or destroyed a number of men-of-war in the arsenal of Chatham, at that time the most important in England; then he sailed up the river as far as Gravesend, so that London quaked at the sound of Dutch guns.¹

Now at last Charles submitted to terms of peace, which was concluded at Breda on the 31st of July 1667. At this peace the Dutch, in spite of the great successes they had gained towards the end of the war, ceded their North-American possessions to England, thus uniting the English colonies of New England with those of Virginia and Carolina.

Notwithstanding this, Charles II. afterwards formed an alliance with Louis XIV., with the intention of ruining the small Republic, which had not yet ceased to be a dangerous rival at sea, and thus the beginning of the year 1672 was also that of the THIRD ANGLO-DUTCH WAR, which, as between these two powers, remained to the end exclusively a maritime contest. Four battles were fought, all in the Hoofden, and all indecisive in spite of the great superiority of the allies and of the obstinate valour of the English under Prince Rupert. This was due solely to the superior tactics of De Ruyter, who boldly took the offensive at every favourable opportunity. After two years, new alliances put an end to this unnatural war, in which England was almost exclusively promoting the interests of France. In February 1674 the Dutch concluded a separate peace with England, but as they continued the war with Louis XIV. both by land and in the Mediterranean, they were forced to make to England various concessions and to acknowledge her supremacy in the "British Seas".

Despite the abuses prevailing under Charles II. the English war-navy went on steadily expanding; the Duke of York, the King's brother, afterwards James II., largely contributing to this result. It stood in need of such development in view of the surprisingly rapid growth of the French Navy, which under Colbert's wise and vigorous administration rose in 22 years from 3 Ships of the Line (1661) to 71 such ships (1683). The crews and officers received such excellent

¹ "It was said that, on the very day of that great humiliation, the King feasted with the ladies of his seraglio, and amused himself with hunting a moth about the supper room." (Macaulay.)

The translator.

tactical training under Du Quesne, Tourville, and other admirals that already in 1676 they made a good fight of it in the Mediterranean against De Ruyter himself. After a considerable interval of time the English had to engage this force, William of Orange having meanwhile, in consequence of the revolution of 1688, ascended the throne of England. The English did not engage in this struggle single-handed, but fought side by side with those very Dutch whose strength they had largely reduced in the three obstinate wars above recorded.

At first the French were in the ascendant. Without hindrance they conducted James II. with a body of troops to Ireland and repeatedly sent him re-inforcements. Admiral Herbert's attempt to prevent this was repulsed by the French admiral Château Renault outside Bantry Bay (1689). Met by a large fleet under Tourville, Herbert withdrew from the Isle of Wight as far as Dungeness; being finally compelled to fight by orders from government, he sent on 10th of July 1690 only the Dutch Squadron, which led the van, into the fight off Beachy Head. The Dutch suffered severely and then Herbert retired into the Thames. The French were now masters of the whole Channel, but fortunately for England they did not take advantage of this opportunity, which 114 years afterwards Napoleon desired so eagerly. The opportunity did not return, for in the following years the allies had received such reinforcements that Tourville had to limit himself to sailing up and down the Channel for the purpose of damaging his enemy's trade. And when in 1692, upon express orders from Louis XIV., he attacked at La Hogue the fleet of the allies, which was of twice his strength, he suffered a complete defeat.

After that the French had had enough of maritime warfare on a large scale, and contented themselves with doing damage to the maritime trade of England and Holland; there was no further pitched battle at sea. The allied fleets attacked French ports, obstructed their traffic, and endeavoured to protect their own commerce. In this, however, they were not altogether successful; the French did them great harm, partly with their men-of-war and partly by audacious privateers like Jan Bart, Dugay-Trouin, and others. The peace of Ryswijk on the 20th of September 1697 effected no change as between the Maritime Powers, but France was wholly exhausted.

This, however, did not prevent her in 1702, barely 5 years afterwards, from raising claims to the Spanish throne, and waging a new war in alliance with Spain against England, Holland, and the German Empire. Although this war lasted till 1713, yet there took place only one single

battle at sea, that of Malaga on the 24th of August 1704, which was a mere cannonade-duel between ship and ship, fought according to prescribed rules of warfare and ending as a drawn battle. After that the French fleet refused to accept battle, and from 1709 onward, in consequence of the exhaustion of the country, it did not put in an appearance at sea. For the same reason, Holland, who had to wage war on land as well as at sea, was in 1707, and afterwards, unable to send out more than one third of the stipulated number of ships. The English then acted accordingly. Barring the severe losses which they suffered at the hands of French privateers, they were sole rulers of the sea, and wisely utilized this state of things for the benefit of their trade and sea-dominion.

As early as 1702 Admiral Rooke sunk a Spanish platefleet in the harbour of Vigo. Returning in 1704, shortly before the battle of Malaga, from an unsuccessful expedition in the Mediterranean, he landed a corps of English and Dutch troops under the Imperial Field-Marshal the Prince of Hesse-Darmstadt at GIBRALTAR, which was feebly garrisoned and badly defended. With the aid of the fleet, the fortress, after a short bombardment was taken by storm, and it has since become one of the most important bulwarks of England's power.

In 1708 the islands of Sardinia and Minorca were taken. At the peace of Utrecht Austria got the former, but the latter with the beautiful haven of Port Mahon remained nearly 50 years in the possession of England, being an excellent strategic position for the fleet in the western Mediterranean. France had to dismantle the forts of Dunquerque, that dangerous place of refuge for privateers, and to abandon all her claims, to Newfoundland and Nova Scotia in America, retaining only Canada, and the island of Cape Breton off the coast of Nova Scotia. This rendered very problematical the execution of the plan prepared under Louis XIV. of founding a great French colonial empire that should extend from Canada, across the great lakes southwards as far as Louisiana, and embrace the huge and fertile basin of the Mississippi, and thus cut off the English settlements on the Atlantic from the hinterland to the west of them. From Spain, England obtained the notorious *Assiento*, or the monopoly of the importation of slaves from Africa to her colonies, a prolific source of profit, which was largely increased by the contraband trade connected with it. As a matter of fact the whole trade of Spanish America passed over to England, just as the trade with Portugal had done by the Methuen treaty in 1703.

The only advantage gained by the Netherlands under this treaty was the safety of their land-frontier towards France. Their commerce and their prosperity, and consequently their power at sea, had been so reduced by friend and foe that they ceased to be of any account in international affairs. France was equally prostrate, her fleet was of slight importance, and as it found no employment Du Quesne and Tourville found no imitators or successors. The Spanish navy, greatly enfeebled as it already had been, fell into total decay. Thus Great Britain now stood forth as sole mistress of the sea. Thanks to her superior navy, no enemy set foot on her shores during the whole of the war; her commerce, expanding by leaps and bounds, brought her ever increasing wealth; and her prosperity was steadily augmented.

The peace of 26 years that now ensued suffered only one interruption. A Spanish fleet sailing in disorder off Cape Passaro in Sicily was without declaration of war attacked and almost wholly destroyed by a much stronger English fleet, thereby thwarting the aspiring and ambitious plans of Cardinal Alberoni, who by energy and circumspection had in a short time raised Spain and her navy to a considerable height. This action paralyzed Spanish sea-power once more, without any war arising therefrom.

Great as was the expansion of the mercantile navy during that period of peace, there was no corresponding progress in the war-navy. This was due to the want of a wise administration and to the everdeepening corruption of morals under Walpole's ministry. Rigid adherence to use and custom, and a decided dislike of all theoretical consideration, and therefore of well-founded alterations, caused the structure and the armament of the men-of-war to keep pace with the scientific progress of the day, as little as had the study of tactics. Posts were filled, not according to merit and capacity, but according to political requirements; the government of the fleet was intrusted to incompetent hands; discipline was relaxed, and gross abuses crept into the administration. The body of officers consisted of very heterogeneous elements, the crews were mostly collected by the press-gang, and as the requirements rapidly increased they consisted mostly of the scum of the people, and even of men who physically were wholly unfit. Stern discipline, accordingly, was indispensable, and was often barbarously enforced. In consequence of the wretched accommodation and bad food of the crews, and of the defective sanitary arrangements on board, disease and death made havoc among the men, and largely reduced the efficiency of the ships for war-purposes.

Dissensions arose in consequence of the contraband trade carried on, on a large scale, and with great audacity by the English in the Spanish colonies. The Spaniards opposed it with much harshness and exercised the right of search even beyond their territorial waters. This latter charge was denied, but the parliamentary opposition in England exaggerated the occurrences to such a degree, that Walpole felt his position endangered by popular irritation. Accordingly in October 1739 war was declared against Spain, letters of marque having been issued three months before. France gave open support to Spain from the very beginning of the war, but not actively before March 1744.

In consequence of the long neglect and the incapable administration of the navy the first six years of the war were uneventful. It was fortunate that the French fleet under Louis XV. was in a still worse plight, and the Spanish fleet was of no account whatever. The first expeditions of the English were directed against the Spanish colonies, when England's supremacy at sea made itself painfully felt by her enemies in their land warfare in the Western Mediterranean. A large expedition sent to the West Indies failed on account of disputes among admirals and generals, and of disease and mortality among the crews. A small expedition under Anson to the west coast of America and to circumnavigate the world did the Spaniards great harm in spite of the great sufferings and losses of the English crews by scurvy &c; the men having in less than a year been reduced to only one third of their original number. The sole permanent effect produced by this expedition was, that this eminently skilful commander trained a number of officers in his own methods, and that he returned home so enriched with the booty he had made, that he was able to aspire to play an important part in his native country. But when he arrived home about the middle of 1744, he was received coldly and reduced to half pay. Six months afterwards however, chance placing at the helm a ministry favourable to him, he received an appointment at the Admiralty, where he served his country till the day of his death in 1762, having, with a short interruption, filled the office of First Lord of the Admiralty ever since 1751. With correct insight, and on the basis of his large and varied experience, he introduced during his years of office suitable reforms, and found wise employment for the navy; he also improved the discipline and promoted the most skilful officers.

The only great battle during the whole of this war was fought near Toulon on the 22nd of February 1744 by the English against

the combined Franco-Spanish fleet. In spite of the superiority of the English it turned out a drawn battle, because the English admiral in command was not sufficiently supported. This led to tedious legal proceedings, which undermined discipline still more. In 1745 the French intended to land a large force in England in favour of the Pretender; this was frustrated partly by bad weather and partly by the irresolution of the French admiral in command of the expedition. Then the French abandoned that intention and devoted themselves to the advancement of their extensive colonial schemes in North America and the East Indies. Anson however frustrated their attempt at sending out re-inforcements by assembling the English ships cruising along the French coasts and lying in wait off Cape Finisterre. At first he took the command himself, and in May 1747, abandoning the rigid tactics hitherto observed, he totally destroyed a smaller French squadron. He then handed over the command to Rear Admiral Hawke, who on a larger scale and after severe fighting gained a similar victory a few months later, in October 1747; these were the first decisive successes of the fleet since 1718. Damage was moreover done to the enemy by capturing their merchantmen and disturbing their maritime trade, which, besides the injury done to their commerce, checked their military operations, principally those on behalf of the Pretender, who in 1745 had effected a landing in Scotland.

The peace of Aix la Chapelle (1748) which reduced everything to the *status quo ante bellum*, was a mere armistice; for the conflicting interests of the great commercial companies, and the attempts to extend the colonies, led to much friction and to feuds in North America and in the East Indies. Though the government of the country was slack in every way, Anson who was the soul of the Admiralty even whilst still a Junior Lord, utilized the time of peace effectually by regulating the promotion of officers, fixing their uniforms, codifying the articles of war, improving the discipline, introducing marines, at first to the number of 50, shortly afterwards of 100 companies; improving the building and equipment of ships, abolishing abuses in the dockyards, founding the port of Halifax in Nova Scotia &c. &c.

Ships were being fitted out at the beginning of 1755, and hostilities at sea soon followed. Towards the end of July, Hawke was sent out with a strong squadron to cruise along the west coast of France, and albeit that no declaration of war had taken place, he was ordered to pick up French vessels, peaceably or by force. By the

end of the year the English had 300 prizes and 8000 prisoners in their hands. This was the prelude to the *Seven Years' War* which for England was a maritime and transmaritime war, and not only confirmed her supremacy at sea, but made her the First Colonial Power in the world.

War was not declared till May 1756, and was unsuccessful in the beginning. The French made a feint of landing in England, so as to keep the English fleet engaged near home; meanwhile they surprised Minorca by a large expedition from Toulon. A squadron under Admiral Byng, sent in relief from England, arrived before the island somewhat late, and was on the 20th of May beaten off by the French squadron under La Galissonnière. Byng now returned to Gibraltar and on the 28th of May, Port Mahon capitulated. This failure produced such a fury of indignation in England, that King George II. was compelled to call to the helm the elder Pitt, who speedily inspired the Court, the Parliament, and the Nation with a spirit so fiercely aggressive, as to enable him, jointly with Anson, to initiate a new, carefully planned campaign at sea on a large scale; the first since the times of Cromwell and Blake. The aims were: to blockade the French coasts; to interrupt their communications by sea and thus cut off the colonies from the mother country; to ruin their maritime trade; to make vigorous attacks upon the French coasts so as to do them all possible harm; to trouble the country and detain troops, whereby relief would be afforded to England's ally, Frederick the Great; and finally to send out combined expeditions of fleet and army for the conquest of French colonies.

No efforts were spared to gain these ends. Of money there was no lack, thanks to the preponderant power of the English navy at sea, which prevented the enemy from setting foot on her soil; maritime trade flourished; and prosperity increased in spite of the war. The fleet and the army were largely increased; the most skilful officers at sea, such as Admirals Hawke, Boscawen, Rodney, Howe, and others were entrusted with commands, regardless of all routine considerations of age of service. "Sink, burn, and destroy" was the watchword which has since become proverbial. The wishes and grievances of the crews about provisions, cleanliness &c. were wisely attended to, and thus at last it became possible that the fleets could remain at sea for a long time and yet be in good fighting trim.

The attacks upon the French ports were not always crowned with positive success, owing to frequent dissensions between the generals and the admirals, but still they gained the object in view. The

French fleet never ventured to accept battle, nevertheless heavy blows were inflicted on it. In August 1759, a French squadron slipped out of Toulon and stole through the Straits of Gibraltar. Admiral Boscawen overtook it near Cape St. Vincent and almost wholly destroyed it. On the 20th of November 1759, Hawke succeeded in the midst of a storm from the west, in running down the French Admiral Conflans, who was scudding before the wind towards the rocky Bay of Quiberon. Darkness setting in, Hawke still audaciously pursued him into those most dangerous waters and completely defeated him — an action, which could only be engaged in by a Commander of high

eminence, who had his forces well in hand, and could absolutely rely on every man's doing his duty to the utmost. These two actions put an end to the enemy's plan of effecting a landing in England on a large scale. Between the dates of these two actions the fate of Canada was decided at the battle of

Quebec, where General Wolfe gained the victory and lost his life; the fleet having conveyed his troops up the St. Lawrence and landed them at a favourable place.

At the beginning of 1762, when France was already totally defeated at sea, Spain joined in the war as her ally. Pitt, who had foreseen

this, wanted to declare war against Spain six months before, and resigned when he found himself unable to carry the Cabinet with him; but even under his feeble successors his spirit still governed the conduct of the war. The new adversary, in the very first year, lost Havana to one great English expedition, and Manila to another that had started from the East Indies; this cooled his warlike ardour so rapidly that an armistice was at once concluded.



Admiral Lord Hawke

IN THE PEACE OF PARIS which was concluded on the 10th of February 1763, and was followed within a few days by that of Hubertus-burg, England, owing to Bute's over-great love of peace, restored many of her conquests, but still acquired Canada and Florida in North America; Dominica, and three more isles of the Lesser Antilles in the West Indies, Senegal in Africa, and the undisputed predominance in India. Thus France's far-reaching plans to form colonies in North America and make conquests in India received their final quietus, whilst England's colonial domain and maritime trade developed on a gigantic scale, in consequence of her predominance at sea having been unequivocally established by her navy.

Still, after a short time this was again put to the test, as France and Spain were only waiting for a favourable opportunity to reduce England's power and to regain their lost possessions. In 1761, only two years after her disaster in Quiberon bay, the French navy began to recover and gain strength, so that in 1778 it numbered 80 ships-of-the-line, whilst Spain had about 60. The English ministries that followed that of the elder Pitt were feeble, and did not produce a single man of eminence; party spirit was rampant, and abuses of many kinds had crept into the administration. Owing to the advancing scientific spirit some great voyages of discovery were made by Cook, Wallis, Carteret, and others; but the war-navy did not attain an expansion commensurate with England's greatness. It is true it had 150 ships-of-the-line on paper, but only a part of them was available, and as for the enlistment of the crews, recourse was still had to the press-gang.

In addition to all this the North American colonies were driven into revolt by harsh legislation, and on the 4th of July 1776 they declared their independence. It is true they did not possess a single man-of-war, but their numerous privateers inflicted great harm on the maritime trade of England. When on the 17th of October 1777, they had compelled General Burgoyne to surrender and had thus given proof of their vitality, France formed an alliance with them, and in 1778 declared war against England, Spain following suit in June 1779. To this was added in 1780 the armed neutrality of the Northern Powers caused by England's harsh conduct towards neutral flags. They aimed at repressing her encroachments at sea, and finally towards the end of the same year she was also involved in war with Holland, which however had ceased to be formidable and was rent by faction.

None of these states had any enemies on land, nor did England attempt any invasion, so that, with the exception of the struggles in the revolted colonies, the war was waged exclusively at sea and in the trans-oceanic possessions. The English Government lacked far-seeing, resolute men, in consequence of which the war was carried on without system and without the assumption of a vigorous offensive as in the times of Pitt and Anson, but it remained essentially a war of defence; the enemies' fleets were neither blockaded in their ports, nor defeated outside them, and the whole war passed by with-



Admiral Lord Rodney.

out producing a single leader of eminence. Thus it happened that hostilities were carried on in five different places at the same time; in the waters near home; at Gibraltar and in the western Mediterranean; on the coasts of North America; in India; and in the West Indies. Everywhere it was the SUPREMACY AT SEA that was in question, and that decided the final issue.

The sole engagement on a large scale took place in the waters near home off Ushant, on the 27th of July 1778. It was indecisive, and the only result it brought was litigation, one of the Admirals preferring charges against Keppel, the Admiral in command, which

merely undermined discipline precisely as had happened after the battle of Toulon, recorded above. In August 1779, a combined Franco-Spanish fleet of 60 ships-of-the-line appeared in the Channel, against which the English could only place 38 vessels in line, whilst an army of 50,000 men stood ready at Havre and St. Malo, waiting

to be carried across; but once more fortune favoured England; the allied admirals were unable to agree; their ships, especially those of Spain, were inadequately manned and equipped, and some were not even seaworthy.—Accordingly the ships of this Great Armada returned to their native ports without having fought or done anything else worthy of note. The danger of a landing in England passed away without again presenting itself during the whole of the war.

The United States could not have permanently withstood single-handed England's might both on land and at sea, but the repeated appearance of French fleets off their coasts brought them direct and indirect advantages; they received re-inforcements and although the French did not actually defeat the English, yet they gained some advantages over them and thwarted their operations; to French co-operation was due the capitulation of General Cornwallis in Yorktown, on the 19th of October 1781, which decided the war.

In the West Indies the belligerents fought for the possession of the Lesser Antilles, and the course of events turned mainly on the alternating preponderance of the English or the French squadrons present on the spot. Six times they met, but always without result, as, owing to the adherence on both sides to traditional use and wont, the hostile fleets merely engaged in violent cannonades. At last on the 12th of April 1782, in the battle of Dominica, Rodney abandoned the obsolete traditions. His fleet sailed by the wind, and with his flagship, which formed the centre of his line of battle, he advanced end on against the enemy's line, burst through it, severed it, and threw it into disorder. He gained a brilliant victory, the first since Quiberon 23 years before; the flagship of the French Admiral de Grasse was captured, and himself made prisoner. English predominance in the West Indian seas was now assured.

In the East Indies, the English as undisputed Lords of the Sea captured all the French and Dutch possessions with little trouble, but in February 1782 Commodore Bailli de Suffren appeared with a French squadron off the coast of Coromandel and immediately assumed the offensive. Without harbour or resources, he fought the English admiral Hughes four times in seven months, and took Trincomalee in Ceylon. In June 1783, just before the arrival of the news that peace was concluded, he fought a fifth battle. But all were indecisive in spite of Suffren's superior tactics, because he was insufficiently supported by his officers. Consequently affairs remained in suspense till the end of the war.

Gibraltar was besieged by the Spaniards from June 1779 till the end of 1782, first on land only, and then also by sea, where the allies assembled a large fleet and cut off all supplies, but on the 13th of September 1782, the heroic commander, General Elliott, baffled all the attempts of his assailants, who even employed protecting floating batteries. For all that, the fort would have had to surrender from want of necessaries, if the fleet had not repeatedly come to the rescue with re-inforcements and supplies; in January 1780, by Admiral Rodney, who had previously at Cape St. Vincent all but annihilated a Spanish squadron sent to oppose him; in March 1781 by Admiral Darby, and in October 1782 by Admiral Howe, with whom the greatly superior fleet of the allies at Algesiras did not venture seriously to interfere.

The Mediterranean however was abandoned to the enemy, the English navy merely acting on the defensive, in consequence of which a large Spanish expedition was able in July 1781 to land 8000 men at Minorca without hindrance, and to lay formal siege to Fort Philip, which was bravely defended; but after a bombardment by 150 guns the small garrison of 1000 men had to surrender on the 5th of February 1782.

Meanwhile open hostilities had also broken out in the German Ocean between the English and the Dutch. Even before the actual declaration of war, England had issued letters of marque against them, captured 200 of their merchantmen, and totally ruined their maritime trade. With difficulty did the small impoverished country fit out a squadron which in August 1781 met an equally strong English squadron at the Dogger Bank. The fleets engaged in a furious cannonade at short range, ship against ship, ending in a drawn battle with vessels on both sides so damaged, that they had to return to their several ports. The Dutch were unable to fit out a new expedition and ceased to be of any weight in maritime affairs; and their colonies, St. Eustace in the West Indies, Surinam, and others, were taken possession of by the English almost without a struggle.

At the end of 1782 preliminaries of peace were concluded, and on the 3rd of September 1783, the treaty was signed at Versailles. England ceded Minorca and Florida to Spain; returned to France her possessions in the East Indies and on the west coast of Africa, as well as St. Pierre and Miquelon in Newfoundland; she renounced the restrictions imposed on Dunquerque; and Trincomalee and some other colonies were restored to Holland. On the other hand France surrendered to England all the West Indian islands she had taken,

with the exception of Tobago. But above all England recognised the independence of the United States, thereby losing the whole North American continent with the exception of Canada.

This great war, which was almost wholly fought out at sea, terminated unfavourably for England in spite of the inefficiency of the continental powers of Europe engaged in it.

In the ensuing ten years of peace England recovered with amazing rapidity from the effects of the war, thanks to the growth of her manufactures, to the expansion of her maritime commerce, and to the extension of her Indian Empire. The younger Pitt who had assumed the government at the end of 1783 was a pronounced lover of peace, but was wise enough to keep up the navy in adequate force, and though the old abuses in the administration were left unredressed, yet due provision was made for the speedy equipment of ships to be put in commission, and for the collection of stores in the yards.

When, after the execution of Louis XVI., the French Republic declared war on the 1st of February 1793 simultaneously against England and Holland, circumstances were specially favourable for the English navy. The officers of the French navy, being all Royalists, were scattered by the Revolution; the crews were turbulent and undisciplined; the chief commands were in the hands of incapable Jacobins; and the administration was wholly disorganized. In addition to all this the country was distracted by civil war to such a degree, that towards the end of August 1793 Toulon with 31 ships of the line was handed over to the English, and a mighty coalition was arrayed against that unhappy country, distracted by the Revolution. The Spanish fleet, retrogressing as it had been for two centuries, was of slight account; that of Holland was small, the state itself having been enfeebled; the Danish and Swedish fleets were also unimportant; the Russian flag was not seen on the ocean; and the United States as yet had no war-ships.

At the beginning of the war the English fleet numbered 411 vessels of every kind, amongst them 153 ships-of-the-line; it was far and away superior to all the others, and in the course of years the proportion turned more and more in its favour, because under Pitt's government the war was conducted with great energy, and there was no lack of means in consequence of England's predominance at sea, which almost turned maritime trade into an English monopoly. Partly by new ships which were built in the Royal dockyards and in private yards, partly by purchase, and partly by putting in commission ships

taken from the enemy, the navy increased by leaps and bounds, and speedily numbered more than 1000 vessels of every kind. In 1793 there were only 12, in 1795 more than 100 ships-of-the-line in commission, independent of those stationed in the harbours, and, with the exception of a temporary interruption caused by the peace of Amiens in 1802, this state of things continued till 1814. By 1809 the ships in commission for war purposes were more than 700 in number. The crews were increased in similar proportion; the number of officers of the navy rose from 2378 in 1793, to 6630 at the end of the war; the crews from 45,000 men at the beginning of the war to 145,000 in the years 1811 to 1813.

In the early years of the war, the achievements of the navy were not equal to those under the elder Pitt in the Seven Year's War, although from March 1793 till May 1795, Spain fought on the side of England; the blockades of Brest and afterwards of Toulon were not carried out with due vigour; indeed the English evacuated the latter place towards the end of 1793, leaving behind 25 French vessels; and a French squadron that had sailed out of Brest was not attacked and defeated with the energy of a Hawke or a Boscawen. Nevertheless in the great battle off Ushant on the 1st of June 1794, Admiral Howe gained the victory, and so did Bridport before L'Orient, and Hotham before Genoa, and off the Hyères isles. In a few years the French maritime trade was wholly ruined by English cruisers and privateers, whose number gradually rose to the strength of about 1000 vessels, and the French possessions beyond the seas, in the East and West Indies, fell almost without a struggle into the hands of the irresistible power of England at sea. At the beginning of 1795 Holland under the title of the Batavian Republic, had been forced to join France, and so her colonies shared the fate of those of France; it was then that their Cape Colony and Ceylon passed over to England.

In October 1796 Spain allied herself to France, whereby the latter country gained the superiority in the *number* of ships. The English government now ordered Admiral Jervis, who was cruising in the Mediterranean, to sail out of this sea and to evacuate Corsica, which had been taken in 1794; but at this juncture the genius of the English commander effected a complete change. His crews having received an exemplary good training, he defeated on the 14th of February 1797, at Cape St. Vincent a Franco-Spanish fleet twice the size or his own. In this battle his Commodore Nelson greatly distinguished

himself, and after it Jervis held for $2\frac{1}{2}$ years a large part of the Spanish navy strictly blockaded in Cadiz, Spain's principal naval port.

In the year 1797 the English navy was in imminent danger from internal troubles. The gross abuses of the administration which Jervis characterised as "rotten to the core," especially the bad quality of the food and of the clothing, and the arrears of pay, together with cruel treatment, made the men desperate and drove them into MUTINY. In the middle of April the crews of the squadron intended for the blockade of Brest, lying off Spithead, refused obedience when ordered to put to sea, and afterwards the Channel fleet followed suit. These had hardly been appeased by concessions, when in the middle of May the crews of the ships at the Nore and of the blockading squadron under Admiral Duncan before the Texel, where the Dutch fleet lay, mutinied also; all of the latter, with the exception of two, returning to the mouth of the Thames. They blockaded the river and committed many deeds of violence. Within a month order was restored, the ringleaders were hanged, and many others severely punished. A similar outbreak occurred in October of the same year with the squadron stationed off the Cape of Good Hope. On board a frigate in the West Indies, under whose commander a reign of terror prevailed, the crew killed all the officers and then handed the vessel over to the Spaniards. The only fleet where mutiny did not actually break out, was that of Admiral Jervis, who wisely nipped it in the bud with stern rigour, and so kept his force in front of the enemy in good fighting trim.

After suppression of the mutinies partly by rigour, and partly by concession of the just and reasonable demands of the men, the crews once more became amenable to discipline, in consequence of which Admiral Duncan was, as early as October 1797, able to engage the Dutch fleet in the bloody battle of Camperdown, and with his greatly superior force to inflict so telling a defeat on them, that they put in no further appearance at sea.

Admiral Jervis' action was not confined to the fleet before Cadiz, but extended far beyond. The blockade of the enemy's war ports was enforced rigorously and steadily, and it was everywhere decisively felt that he had assumed the offensive. This was done to the utmost by Nelson, the greatest of his disciples and followers. This hero knew how to gain, in addition to the ready and willing obedience of his subordinates, their affection and full devotion. Being sent into the Mediterranean with a part of the Cadiz fleet he discovered the

French squadron, that had escorted Bonaparte to Egypt and was as strong as his own, at anchor in the Bay of Aboukir. He came in sight of it in the evening of the 1st of August 1798,¹ attacked it immediately, and in spite of the desperate valour of the French, nearly annihilated the whole fleet by his masterly tactics.

This great victory not only frustrated all Napoleon's plans about Egypt and India, but restored to England the preponderance in the Mediterranean which she had evacuated, and thus essentially modified the political situation; its moral effect moreover was far-reaching and strongly influenced the march of events. For 100 years previously the French, adhering to their traditions, had avoided going in search of the enemy in the open sea and fighting him for the supremacy on the waters; all they aimed at was to avoid him, and battle they would accept only, if it was unavoidable—Suffren alone was a glorious exception to this rule. By dexterous manœuvres he had often gained advantages even when his forces were no more than equal to those of the enemy. But from now forward no French officer of the navy hoped for success, even with superior forces. Upon this rock were wrecked all Napoleon's schemes against England, whom, from the outset, he had regarded as his principal foe, and whose ruin was the direct and indirect object of all his ventures.

The English Government on the other hand steadily pursued the one aim of making its fleet, not predominant, but the *sole ruler of the sea*, and to gain this end every other fleet had to be blown out of the water. Therefore in 1799, it engaged jointly with Russia in a great expedition against Holland. A landing was effected near the Helder, and hardly any resistance being offered, this naval port was occupied. The 25 Dutch men-of-war lying in the river Texel, 16 of which were two-deckers, surrendered to the allies without firing a shot, the crews refusing to fight. They were taken possession of in the name of the Prince of Orange, but afterwards incorporated with the English navy. The army that had been landed fought a few unsuccessful engagements, then re-embarked and returned home.

When in November 1800 the three Northern Powers once more joined in an Armed Neutrality to check England's encroachments at sea, a large English fleet was sent early in the year 1801 into the Baltic, the Russian ships being still detained by the ice. Admiral Parker was Commander-in-Chief and Nelson was Second-in-Command. On the 2nd of April Nelson led his squadron with great audacity

¹ In England this battle is known as the "Battle of the Nile." The translator.

into those very dangerous waters and fought the BATTLE OF COPENHAGEN, in which both parties fighting with great bravery suffered heavily, without arriving at a decisive result. Thanks however, to the personal intervention of the famous Admiral, Denmark was induced to withdraw from the alliance, which in fact was wholly dissolved owing to the assassination of the Czar Paul I. on the 23rd of March.

In the summer of the same year Bonaparte, in his capacity of First Consul, concluded peace with all his enemies on the continent, and made preparations for the invasion of England, collecting at Boulogne an army and a large number of flat-bottomed vessels. To lessen the keen anxiety caused thereby, Nelson was appointed commander of the coast defences from Orfordness as far as Beachy Head, but he was unable to effect anything against the flotilla, which was well protected and bravely defended.

The armistice concluded, after Pitt's resignation, by Addington's feeble ministry on the 12th of October 1801, put an end to all further combats, and in the Peace of Amiens concluded on the 27th of March 1802, England restored all the conquests she had made, excepting the important islands of Trinidad in the West Indies, Ceylon, and Malta, which latter place the French commandant had been forced to surrender to England on the 5th of September 1800, after a blockade of two years' duration rigorously enforced. England was now in possession of an excellent and very strong naval port in a most favourable position, which secured to her fleet in perpetuity a dominant position in the Mediterranean.

When in the middle of May 1803 the war was resumed, the number of ships-of-the-line in commission was speedily raised from 32 at the beginning of the year to 60, and quickly afterwards to 75, and the blockade of the enemy's naval ports and their fleets within them was speedily enforced with superior squadrons; the capture of French and Dutch, and afterwards also of Danish and Portuguese, colonies was again undertaken, and the enemy's maritime commerce was destroyed; the maritime trade even of neutrals suffered heavy loss in consequence of the declaration of paper-blockades for long tracts of coasts, and from the exercise of the right of search. When Spain, towards the end of 1804, formed an alliance with France, she had to endure all the hardships of a state of war inflicted by the sea-dominating power of England.

Bonaparte renewed his preparations for the invasion of England on the largest possible scale; in addition to 30 ships-of-the-line he

ordered hundreds of flat-bottomed boats to be built, sufficient to carry over an army of 150,000 men, and at the beginning of 1805 these were assembled in six ports between Texel and Havre, the largest number being at Boulogne. The squadrons of Toulon and Rochefort were to slip out unobserved and sail to the West Indies to draw the English blockading fleets after them; they were then to return to Europe, join the Spanish fleet at Ferrol, attack the blockading fleet outside Brest with superior force, defeat it, and then re-inforced by the ships set free at Brest, secure the command of the Channel and keep an open passage for the army of invasion: — a magnificent scheme, worthy of Napoleon's creative genius; all that was lacking was a leader at sea of corresponding spirit.

The squadron in Rochefort skilfully discharged its task and did the English much harm in the West Indies; speedily (May 20th) it returned to its port of departure without having met the Toulon fleet. Admiral Villeneuve did successfully slip away from Nelson, who for 1½ years had kept him shut in. He was joined by a number of Spanish ships from Cadiz and sailed to the West Indies without being overtaken by his pursuing enemy. On his way back he encountered, on the 22nd of July 1805, the English blockading squadron outside Ferrol, which, though inferior to his own, gained some advantages in the indecisive battle that ensued. The English now sailing home, Villeneuve was able to join the ships of the allies inside Ferrol to his own fleet. He now had 29 ships-of-the-line under his command and ought to have sailed up the Channel and with his superior force to have attacked the English squadron outside Brest, wherever he met it. But his heart failed him, and instead of sailing north-east towards the Channel, he directed his course on the 14th of August, southwards to Cadiz.

This put an end to Napoleon's intended invasion of England. He immediately and finally abandoned it, and within a week after receipt of the news, that is towards the end of August, he set his army in motion from Boulogne to Austria against the allied Austrian and Russian armies. In a rapid succession of victories these were defeated, and before the end of the year he was able to dictate the Peace of Pressburg. But before that time Villeneuve had met his fate; he had been promptly blockaded in Cadiz and coming out to meet Nelson's blockading fleet he was, in spite of his considerable superiority of force (33 ships-of-the-line against 27), totally defeated and made prisoner on the 21st of October in the glorious BATTLE OF TRAFALGAR.

The ships of the French van that escaped fell, on the 4th of November, into the hands of an English squadron off Cape Ortegal. These decisive victories formed the concluding act of the great drama of maritime warfare. The French navy, far from being annihilated, still numbered 32 ships-of-the-line fully equipped, and moreover Napoleon had so many new ones built, that at his deposition there were 73 ships-of-the-line in existence. French squadrons more than once succeeded in eluding the English blockading fleets and putting to sea, but they never again engaged in a pitched battle. On the other hand the English enforced with much rigour their blockade of the naval ports of their enemy, and to some extent of the coasts of France, and of



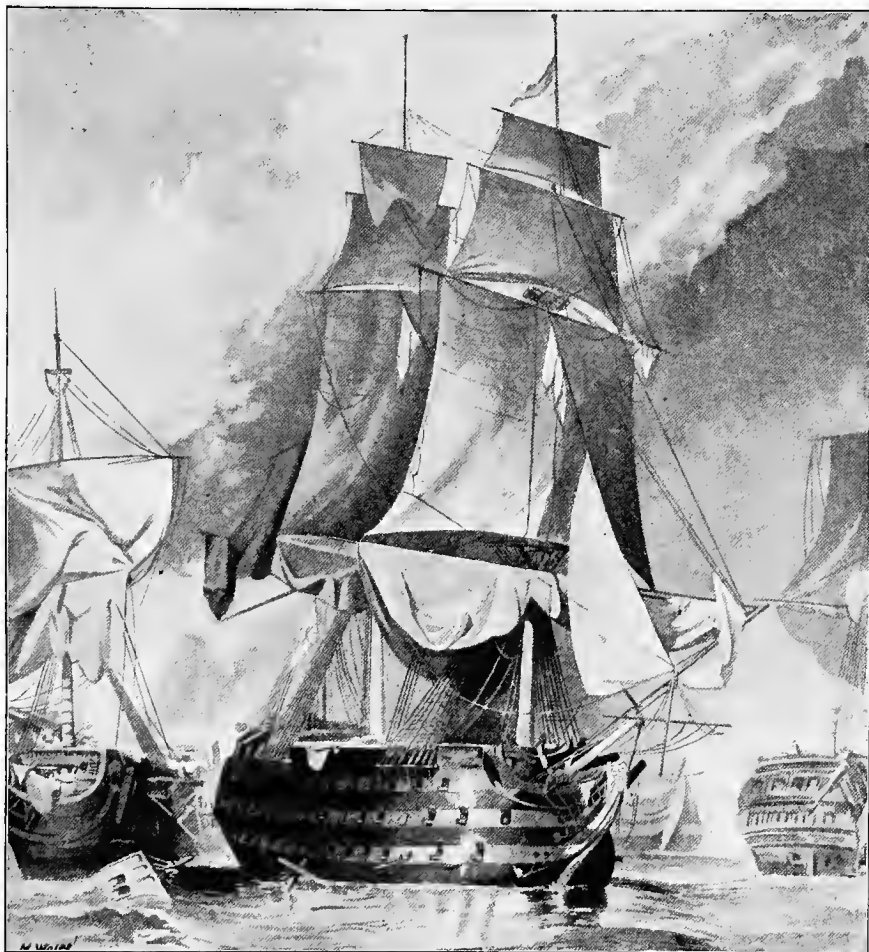
Nelson in the cabin of the "Victory" making his will before the battle of Trafalgar.

the countries under French rule; a very remarkable performance. French merchantmen and even men-of-war were often cut out from fortified roadsteads by surprise attacks with boats; in 1809 a squadron

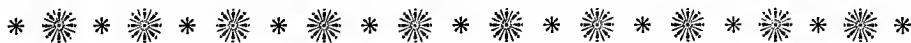
lying under the isle of Aix off Rochefort was all but annihilated by fire-ships. The "Continental System" enforced by Napoleon after the overthrow of Prussia in 1806, by which all English goods were excluded from the continent, was a severe blow to English trade, but some compensation was found in an extensive contraband trade carried on, on a huge scale, under the protection of the fleet.

An emporium of supreme importance for that object was Helgoland, which was taken from the Danes in 1807 for that very purpose. In the same year after the Peace of Tilsit, which isolated England and gave her cause for anxiety on account of the newly formed Franco-Russian alliance, she sent a large expedition of ships and men to Copenhagen without declaration of war; the city was bombarded from the land and taken; and the whole fleet of 18 ships-of-the-line with stores &c. was seized and carried away. A few months previously an English squadron had been sent with like orders to Constantinople, and but for the want of resolution of Admiral Duckworth and his diplomatic adviser, the same fate would have overtaken the Turkish capital and fleet.

In such manner did the English navy rule the sea without control. Once more French, Dutch, and Danish colonies were seized one by one, even Java fell in 1811. The Indian Empire, untouched by the war, steadily grew in extent. England's maritime trade was certainly injured to some extent by French privateers, but still it increased year by year; maritime commerce being all but an English monopoly. The prosperity of the country increased and there was no limit to England's borrowing power at a low rate of interest, whilst on the continent distress grew from day to day. The dominion of the sea enabled the government to fit out expeditions to every coast, and there was no lack of means. In 1809 a large expedition was sent to the Low Countries; unfortunately too late to effect, as was intended, a diversion in favour of Austria, then at war with Napoleon. It was to have destroyed the French fleet at Flushing and the port of Antwerp, but it totally failed. On the other hand, the war in Portugal and Spain under Wellington, which had begun on a small scale, but assumed ever larger dimensions and greater importance, and ultimately in 1814 even led to the invasion of France, contributed greatly to the results of the war against Napoleon. Only the supplies brought to the English armies by their fleet enabled them first to maintain their ground and ultimately to advance; this was especially the case in 1810, when they were cooped up in the lines of Torres Vedras.



"Victory" (Nelson's famous Flagship)
at the battle of Trafalgar



It was also due to the action of the fleet that the Russian squadron at Lisbon under Admiral Senjavin surrendered; and again it was the fleet that brought back from the island of Fünen, whither Napoleon had sent them, 10,000 Spanish troops desirous to fight for their country. Finally in 1815, the fleet also frustrated Napoleon's plan to escape to the United States by enforcing a most rigorous blockade of the harbour of Rochefort, whereby he was compelled to surrender on the 15th of July to the commander of the English ship-of-the-line, the "Bellerophon."

These examples sufficiently demonstrate first, that the English fleet proved itself a very effective and sharp instrument, not only for the advancement of the country's maritime policy and the expansion of its power, but also for the promotion of the objects of the war which continental nations are wont to regard as a land-war; and secondly that the navy exercised a deep-reaching influence on the march of events.

The ruthlessness with which the navy had acted even against neutrals, had led in 1812 to a WAR WITH THE UNITED STATES, which avenged the contempt with which the dominant navy had for years looked down upon the fleets of all other nations. The United States did not possess a single ship-of-the-line; they had a few frigates, corvettes &c., but these were superior to English ships of the same class in size, structure, speed, armament, and crews. Avoiding pitched battles with English squadrons, they captured in single combat between ships of like kind, several English men-of-war, and amongst them three frigates, in the very first year of the war. In addition to that, hundreds of their privateers inflicted great harm on English commerce; but in this respect the English retaliated upon American trade with equal effect.

The Peace of Ghent, which was concluded with the United States towards the end of 1814, produced no essential change in the state of affairs, but by the treaties at the end of the wars in Europe, England obtained, in addition to her acquisitions of 1801, in the West Indies, Tobago and St. Lucia; in the Indian Ocean France ceded to her Mauritius (Isle de France) and the Seychelle Islands; Holland ceded the Cape of Good Hope and Guiana; and Denmark gave up Helgoland¹; the Ionian Islands were placed under English protection;

¹ Helgoland has since been transferred by Lord Salisbury to Germany in return for certain concessions in Africa; the Ionian Isles were delivered over to Greece by Mr. Gladstone on sentimental grounds. The translator.

and it was agreed that the important port of Antwerp, which might eventually have become a base of operations against England, should be made a purely commercial port.

f. Expansion of the Dominion of Britain into a World-Empire.

After the fall of Napoleon the British fleet was largely reduced; in 1817 there were only 124 ships in commission, inclusive of 14 ships-of-the-line, as compared with upwards of 100 only 4 years previously; the crews were reduced from 140,000 to 19,000. The numerous and important acquisitions spoken of above, and the fact that her navy dominated all the seas without rival, had conferred on England a world-ruling position; she was able at pleasure to extend her territories without let or hindrance in India and Further India, in South Africa and Australia; she could by peaceable means or by force open new avenues to her commerce, and appropriate as *points d'appui* islands or fortified harbours that were favourably situated, as for example: — Singapore (1819), the Falkland Isles (1833), Aden (1838), Hong-Kong (1839), and New Zealand (1840). On all those occasions and in disputes beyond the sea, the fleet co-operated with much effect; for example, in the wars against Burma in 1824/25, against China in 1839/42, against the Dictator Rosas on the river Plate in 1845. But for all that, little was done for the further development of the navy, excepting a few improvements in ship-building; people were content to rest on the laurels won in the past.

The first STEAMER of the navy, a small tug, was built as late as 1822. In spite of its obvious advantages it was but tardily imitated; the same thing happened at the introduction of screw-steamers and of iron-clads. The inventions of shell-guns, and grenades, made public by the French general, Paixhans, in 1821, which by reason of their practicability marked a new departure, were ignored in England for a decade and a half. Some progress, albeit a late one, was made by establishing in 1832 the "Excellent" a gunnery school-ship, a name continued to this day, for the systematic training of gunnery officers and seamen-gunners.

In the same year was also effected a thorough reform in the leading authorities that administer the navy; their methods had never been very suitable and had long been obsolete. A reform which Admiral

Jervis had planned some 30 years previously, but had not been able to carry through during the short time that he held the post of First Lord of the Admiralty, was now carried by Sir James Graham, a distinguished member of the House of Commons; he greatly simplified and expedited the routine of office; did away with abuses; and introduced an effective control of the expenditure, which led to a considerable saving.

In spite of this deep-reaching improvement in the administration, the lethargy in military affairs that had set in after the conclusion of the great war continued undisturbed, the French navy all the while growing strong again; its crews were carefully drilled and its effective force was increased by numerous steam war-vessels. After the French had partly armed all their ships with the 22 centimetre¹ shellguns, there ensued in England in 1838 the first "SCARE" at the dangerous neighbour, which has since been repeated from time to time, and has caused large sums to be voted by fits and starts for the increase of the navy. But after a short time people relapsed into their old apathy; and nobody thought of a systematic preparation for war.

Accordingly when in the Crimean war England entered the field as the ally of France, her old hereditary foe, the English fleet proved itself wholly unprepared for the work, notwithstanding the warnings it had received a long time previously. Her sailing vessels were not up to date by the side of the French steamers, especially as the Russians declined all pitched battles both in the Black Sea and in the Baltic; no effect was produced on the Russian coast-fortifications; while vessels to act in shallow water against works on the coast were wanting altogether; and ere the numerous gun-boats ordered were finished, the war was over.

As allies of their old enemies, the French proved themselves superior both in material and in organisation; the French steam war-vessels were both more numerous and more efficient than the English; the screw-steamer "Napoleon", especially, left all English vessels far behind. Similarly the French floating armed batteries at Kinburn far surpassed all the English vessels during the attacks on the forts of the coast, and the arrangements of the French for the transport of their troops to the Crimea and for their support outside Sebastopol were much more carefully considered. But for all that, the high importance of the navy was made evident, unobtrusively but very convincingly, by the

¹ 22 cm = 8·7 inches very nearly. The translator.

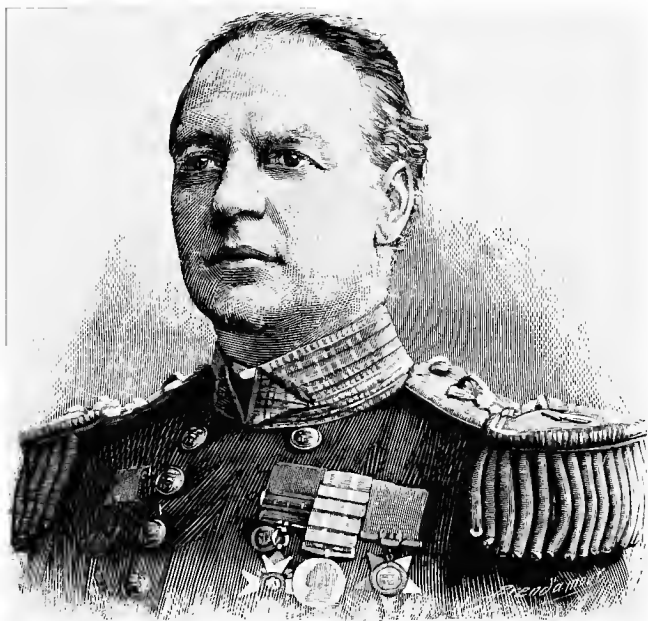
paralysis of the Russian traffic at sea; by the attacks made on harbours and coast-works; by the safe transport of troops to their several places of destination; by the support afforded to their operations; and, finally, by the prompt bringing up of necessary supplies.

At the treaty of Paris on the 30th. of March 1856, the Powers agreed to the neutrality of the Black Sea, to the free navigation of the Danube, to the removal of the Russian frontier further north, away from the banks of the river, and to the exclusion of foreign war-ships from the Bosphorus and the Dardanelles. To this was added England's startling assent to the declaration of the 16th. of April, which abolished privateering, protected enemy's goods under neutral flag, and admitted the legality of effective blockades only; all being principles of maritime law in flagrant contradiction to the practices previously observed.

Only a few years later in 1860, France caused a new "scare". She had successfully constructed the first iron-clad ram, the "Gloire", and immediately set about building a number of sister-ships. This gave the impulse to the construction of the English iron-clad navy which is even to-day still in progress — the two frigates, the "Warrior" and the "Black Prince" previously begun, were mere partly-armoured mongrels and of no account. In consequence of the want of system and of expert knowledge, a great variety of types, both of large and small battle-ships and coast defences, was adopted. In times of scares large sums were voted and many ships built, at other times the number of ships built was small, so that the English iron-clad fleet of the first three decades represented a motley collection of specimens. The taunt rigging of sailing vessels, which is almost wholly useless, was adhered to with tenacity, even with ships of low freeboard, till in 1870 a battle-ship, the "Captain", foundered near Finisterre and the whole crew was lost. Still longer the English adhered, in guns, to the pattern of short rifled muzzle-loaders, with a calibre of 406 mm. (= 16 inches) and a length of tube of only 14—18 calibres; a considerable number of the older iron-clads are still armed in this manner. The value of great speed was also not understood for a long time; till the middle of the eighties the English built cruisers of only 11 to 13 knots.

But about that time a complete change set in; the mighty impulse given to matters of warfare by the war of 1870/71 made itself felt also in the English navy. In 1885 began the manœuvres of the fleet on a large scale, which have since been repeated every summer

and are always combined with a partial mobilization. In 1882 the "Intelligence Department" had been organized at the Admiralty, and two years afterwards a section of this department was added to the staff-service of the Admiralty; preparations were made for rapid mobilization, and every branch of the service was roused into a mental activity which had previously been sadly missing; even the senior Naval Lords of the Admiralty, occupying the most exalted and responsible posts, had neglected to inform themselves about the tasks that were set to



Lord Charles Beresford
Post Captain¹

the navy and the means needed for their performance. Special praise is due to Lord Charles Beresford, a post-captain¹ who resigned his post as Junior Lord of the Admiralty in order to have greater freedom and more influence in his work for the benefit of the nation.

The ground having been thus sufficiently prepared, the Conservative Government, which entered office in 1889, took advantage of a new "scare" to present to Parliament a carefully considered SCHEME OF

¹ Now Rear-Admiral. The translator.

SHIP-BUILDING on a large scale, viz: 70 vessels, inclusive of 10 battle-ships, costing 22 millions, and to be built within the short period of four and a half years, and contrary to the tradition rigorously observed till then, of voting only the current year's expenditure, Parliament was asked to vote the whole of the money at once. On the 31st of May 1889 the bill became law under the title of the NAVAL DEFENCE ACT; from that day dates, of course with a large increase of the budget for the navy, the conscious and systematic development and the rapid increase of the new English navy, from which the Liberal Government that followed was unable to depart, and which is even now being continued on the same large scale.

The "IMPERIAL DEFENCE ACT" of 1888 may be regarded as a pendant to the above named Naval Defence Act. By this, £2,650,000 were voted for the fortification and equipment of harbours and coaling stations at home and abroad, so as to secure predominance at sea in all quarters.

g. Work of the Navy in Times of Peace.

In addition to the work done by the navy in the wars narrated above in protecting the empire, the colonies, and the mercantile marine, the fleet also co-operated in many smaller wars, principally in distant seas; but even in times of peace it was called upon to act in a warlike capacity, such as doing police duty on the waters; protecting commerce by repressing piracy which was prevalent in the Mediterranean, in the West Indies, and in the China Seas till far into the present century, and is even now not wholly extinct; also in suppressing the slave trade, a work in which England has pre-eminently distinguished herself ever since 1816; in chastising savages and the like; moreover by exhibition of England's power in foreign ports, and at times enforcing temporary blockades, concessions of various kinds were wrung from foreign powers. In 1890 the Government of Lisbon was forced to cede extensive districts in Africa, merely by the concentration of British squadrons near Portugal and her possessions.

The fleet moreover advanced navigation, and the knowledge of the seas, and of Geography generally by work wholly unconnected with war, such as making voyages of discovery in connection with scientific investigations, and conducting soundings and various kinds of surveys. These latter have been conducted and are carried on even now extensively and systematically in many seas.

Voyages of discovery were first engaged in in 1497, when the Venetian, Cabot, in the service of Henry VII. arrived with English ships off the mainland of America even before Columbus had done so. A long pause ensued, and then the great time of Elizabeth set in; the time of Frobisher, Davis, Hudson, each of whom making three voyages in search of the north-west passage to Eastern Asia, and followed by Hall, Baffin and others penetrated the frozen Arctic seas. These were followed by Drake, Gilbert, and Raleigh, who visited portions of the eastern coast of what is now called the United States; Drake during his circumnavigation of the world, visiting also the western coast as far as San Francisco, and so on. In 1740—44, Anson made a similar voyage, and from 1764, after the conclusion of the Seven Years' War, voyages of discovery were made in the Pacific by Byron, Wallis, and Carteret, and foremost of all by Cook over the whole Pacific, when he discovered Australia, in which regions Vancouver and Flinders rendered valuable service after him.

In the period of peace following upon the fall of Napoleon I., Ross and Parry initiated a new era of voyages into the Arctic seas east and west of North America, some seeking the North-west passage, and some afterwards in search of the unfortunate Sir John Franklin, who together with his companions lost his life in a similar enterprise. In 1850 the existence of such a passage was demonstrated by MacClure, and in 1859 MacClintock discovered the remains of Franklin's expedition. Other voyages also were made, too numerous to be recorded here. In 1875/76 the last English attempt to reach the North Pole was made by Nares, who had for three years previously been engaged in making scientific voyages to study the oceans.

In the voyages of discovery places were named, their positions were determined, and surveys of all kinds were executed; moreover, for a long time, vessels of every kind specially fitted out for such purposes were employed in every sea. To the English navy navigation is indebted for most of the sea-charts and sailing-directions, and in many cases none but English charts are available; in consequence of this and of the fact that the English maritime trade exceeds that of all the other nations put together, English has become the universal language of all seafaring men. Among those who have made surveys at sea may be mentioned with distinction the names of W. H. Smyth, Belcher, and Beechey; and amongst the investigators of maritime meteorology, those of Beaufort and Fitzroy.

II. ADMIRALTY.

a. Introduction.

An organization of the supreme authority, in harmony with the changing circumstances of the day, is the indispensable condition of the efficiency and wise employment of any military force. The government of all the navies, except that of Germany, is vested in a single supreme authority, which controls all technical and financial affairs, the appointment and promotion of officers, and a multitude of the most varied branches of the service; — it is, in a word, a mighty and most complicated machine. To construct that skilfully, and to make it work smoothly, so that the desired results are obtained rapidly, satisfactorily, and with the least possible amount of friction, is perhaps the most difficult of all problems of organization hitherto propounded, and has certainly as yet been nowhere thoroughly solved.

This supreme authority, elsewhere called the Ministry of Marine, is in England called the ADMIRALTY; its present organization is considered by many as the best extant, although a bureaucratically trained eye detects in it many a peculiarity, illogicity, and even at times incomprehensibility; for example, in the whole of the Admiralty there is not a single official who has received a legal education.¹

It is only lately that the sphere of activity of the Admiralty, as it is at present, has been defined; it had been subjected to many changes, and in early times its organization had frequently been radically altered; but the favourable insular position of the kingdom, and the consequent steady progress in its internal institutions has enabled also the Admiralty with but few interruptions, to adapt itself to the changing and growing demands of the day. From time to time there have risen men of exalted talent and creative genius, who have with a strong hand carried through the necessary and incisive changes.

b. Historical Development.

Up to the 15th Century the affairs of the navy were regulated by the "King's Council." The chief command over the fleets assembled from time to time according to requirements, was vested in officers of high rank, who down to the 13th century were called "Keepers

¹ There is, however, an entire branch called "The Legal Branch". See Navy List July Edition 1898. pp. 449—51. The translator.

of the Sea," and after the introduction of the new title they were designated as Admirals. In 1406 Henry IV. appointed the Earl of Somerset as the first "Admiral of England," who was now placed permanently at the head of the navy; his powers and duties being gradually enlarged; the leading Admiral had the title of "Lord High Admiral" conferred on him, and his badge of distinction was a golden whistle set in jewels and suspended by a chain of gold. The first patent of this kind, the counterpart of which is used to this day, was bestowed by Henry VI. on Warwick the Kingmaker (1470). Over large fleets the Lord High Admiral took the command in person; on less important occasions this command was entrusted to the "Vice-Admiral or Rear-Admiral of England."

After the early Tudors had begun the institution of a permanent Royal Navy, Henry VIII. organized the Admiralty as a military authority under the Lord High Admiral for the government and employment of the Navy; its seat was in London and subject to it was the "Navy Board," that administered the so-called civil branches of the service, such as the victualling department, the artillery, and the management of the three dockyards at Woolwich, Deptford, and Portsmouth; another authority, a part of this new organization, was Trinity House that had to superintend the general affairs of navigation, such as lighthouses, pilotage, beacons, buoys &c. The subordination of the Navy Board to the Admiralty was nominal rather than actual, for it was practically independent, and like its several sections and the victualling yards, speedily became wholly independent; consequently, when the supreme authority was inefficient gross abuses quickly crept in, as for example in the times of James I., under Lord Howard of Effingham, then grown feeble and senile.

This organization remained unchanged in all its essentials down to the murder of the Lord High Admiral, the Duke of Buckingham, the favourite of Charles I., in 1628. After that, this exalted office was no longer conferred on any single individual, but its duties were discharged by a Commission of eminent Officers of State under the patent of the Lord High Admiral, the tenour of which defined their functions. Outside the general instructions of this document there existed no special regulations, affairs being managed, as of old, according to ANCIENT USAGE AT SEA.

After the execution of Charles I., the Admiralty and the Navy Board were abolished, and the government of the navy was entrusted to a Committee of the House of Commons, consisting of three Colonels

of the army, who were designated as Generals and Admirals at Sea, and who, in addition to the administration of the fleet, undertook also the supreme command of it, a duty in which Blake gained pre-eminent distinction. In the management, formerly so rotten, order was now introduced in all branches, and Cromwell settled the first fixed budget for the navy, to the amount of £400,000; in his time the navy flourished beyond all precedent. All this however changed with the restoration of Charles II. in 1660; he immediately appointed his brother, the Duke of York, as Lord High Admiral, and the old authorities were re-instated, and with them, in spite of all the endeavours of the Royal Chief to the contrary, all the former abuses returned when the Duke, after the passing of the "Test Act," which excluded Catholics from all government, had to resign his office. Its duties were once more discharged by a commission at the head of which was Prince Rupert of the Palatinate, down to the death of Charles II. in 1684, when King James II. recognising the supreme importance of the navy, took its management into his own hands.

The revolution of 1688 introduced new changes and more continuity. It is true that in 1701 the Earl of Pembroke was Lord High Admiral, and from 1702 to 1708 this post was held by Prince George of Denmark, the husband of Queen Anne, but as neither of them was a sailor by profession, both turned out failures. With these exceptions, and barring an interruption of 15 months in 1827/28 in favour of the Duke of Clarence, afterwards King William IV., the duties of this office have since 1689 been discharged by a Committee, the so-called LORDS OF THE ADMIRALTY, or to give them their present official title, the "COMMISSIONERS FOR EXECUTING THE OFFICE OF LORD HIGH ADMIRAL OF THE UNITED KINGDOM OF GREAT BRITAIN AND IRELAND &C." The first regulation by law was made 1690—92, from which time forward the organization remained unchanged down to the beginning of the 19th century.

In the Navy Board however, frequent changes took place, new departments being created and abolished by turns. For example, the Transport Office organized immediately after the revolution of 1688, on account of the wars waged by England on the continent and in Ireland, was abolished in 1724 during the long period of peace after the conclusion of the War of the Spanish Succession. It was reorganized again in 1794 upon the outbreak of the war with France, and again abolished in 1817 during the time of peace following after Waterloo. On the whole, the number of departments kept on increas-

ing, till in 1782 there were 13 of them, mostly having their seat in different parts of London, although some were domiciled in Chatham, or Greenwich, or Portsmouth. General supervision and individual superintendence and scrutiny becoming more and more difficult, abuses crept in to the great detriment of the navy, till towards the end of the century there arose grave difficulties between these departments and the Admiralty.

Admiral Jervis, promoted in 1801 to the post of First Lord of the Admiralty, he who had formerly declared the Navy Board to be "rotten to the core," was as able an administrator as he had proved a skilful commander of the fleet. He began by restoring order thoroughly and systematically; but partly owing to his time of office being short, and partly to the tenacious resistance of red-tapists, he was unable to effect an essential amelioration; nevertheless the investigations conducted by him brought to light many glaringly reprehensible practices (as for example the yearly disappearance of half a million sterling), so that improvements had to be gradually introduced.

Up to 1796 the officials of the Admiralty paid themselves by perquisites, but from that time forward they received a fixed salary, and further reforms were effected in the first quarter of the 19th century; but for all that, the mechanism of the office was very clumsy and costly till 1832, when Sir James Graham, an eminent Member of Parliament, as First Lord of the Admiralty, carried through the complete reform striven for by Admiral Jervis. He abolished the Navy Board, and instead of it organized five "Civil Departments" for ship-building and equipments, victualling and transport, stores, health, and accounts, all having their seats in London, near each other. The Admiralty Committee consisted of the First Lord, who ruled supreme over all the departments, and five other Lords besides (four being Naval Officers, and one a member of Parliament as Civil Lord). These six Lords met almost daily settling all important affairs in common, the "Parliamentary Secretary" keeping the minutes of these meetings. The official business of the Committee was in the hands of the "Permanent Secretary," who did not (like the six Lords and the Parliamentary Secretary) resign with every change of the ministry, and who thus preserved the continuity of the work and the traditions of the office. A large number of officials were now found superfluous, and a yearly saving of about £60,000 was effected. This organised co-operation of all the six Lords proved a very efficient instrument; it

worked harmoniously, rapidly, and effectually, and in all essentials it exists to this day. An alteration introduced by Mr. Childers in 1868/69, making the five Lords under the First Lord, to a certain extent mere chiefs of departments, was abolished after only three years; the same thing happened with some changes of posts, such as the appointment of a Chief of the Staff, of a Naval Secretary,¹ of an engineer as a second Civil Lord, and the abolition of the Permanent Secretary.

c. Present Organisation.

At present the Admiralty is organised as follows: At the head stand the "Lords Commissioners," who have charge of the duties of the Lord High Admiral of Great Britain and Ireland &c.; they are six in number, viz: the First Lord, for nearly 70 years always a member of Parliament, four Naval Lords, officers of the navy who are described severally as First, Second, Third, and Junior Naval Lords, and a Member of Parliament, as Civil Lord.

The Board of Admiralty, which changes with the change of ministry, is appointed by PATENT, which, as has already been stated, is derived from the times of Henry VI. and has, with slight alterations, preserved its original phraseology for four centuries, down to 1872, when at last some obsolete paragraphs were expunged. Now the Lords Commissioners are entrusted with the superintendence of the building and equipment of ships, the wages and employment of the crews, the commands over the officers and naval authorities, the regulations of the service, the appointment of officials, the making of contracts, and with some obsolete privileges.

The patent is a mere formality; an English statesman, who had been First Lord for many years after the Crimean War, confessed that he had never read the patent, nor did he know of any one who had. It does not agree with the "Orders in Council" of 1869/72, which charge the First Lord with the *sole responsibility* of the government of the navy; but this contradiction notwithstanding, the patent is retained, partly from the strong English attachment to old traditions, but mainly because the other Lords are therein named as responsible fellow-counsellors, whereby their dignity is enhanced.

In *reality* however, THE FIRST LORD, as minister of the navy, is alone responsible to the Queen, to Parliament, and to his colleagues, for

¹ The late Captains Robert Hall and Sir George Tryon. The translator.

the formation, maintenance, and efficiency of the navy, for its employment in accordance with the maritime policy adopted by the Cabinet, for its corresponding composition and strength, and for the whole administration of the navy. He can initiate measures and veto proposed regulations; he represents the navy in Parliament. All this does not date only from the Orders in Council of 1869/72, where it is only for the first time distinctly expressed, but was the practice



The Rt. Honble. G. J. Goschen M.P. &c.
First Lord of the Admiralty.

for a long time previously, although in cases of special urgency other ministers have been authorised to issue orders to commanders of fleets, as was the case for example in 1807 at the attack on Copenhagen in the midst of peace. The First Lord takes the chair at the meetings of the "Lords Commissioners" and in most questions he is competent to decide *against* the opinion of all the other Lords. But

not being an expert, he relies greatly on their counsel and support, and is more or less dependent on them; and as he himself has chosen them for his counsellors, and as according to tradition all important affairs are discussed in common at their meetings, and as moreover every one of the Lords has at all times ready access to the First Lord, the relation of the members to each other is one of cordial comradeship. As a matter of fact, the First Lord hardly ever decides an affair of importance on his own sole responsibility.

The administration of the affairs of this central authority is distributed amongst the other five Lords always under the control of the First Lord, to whom they are responsible for their conduct, as follows:—

The Senior Naval Lord, an eminent officer of the navy, nearly always a Vice-Admiral, discharges in all essentials the functions of Commander-in-Chief of the Navy, and is the nearest counsellor to the First Lord in all that concerns the maritime policy of the state. It is his business to watch over the efficient organisation and readiness of the fleet for all emergencies, and to direct its employment; accordingly the "Intelligence Department" is controlled by him, and it is he that elaborates plans of campaign and of mobilisation; he superintends the hydrographic section which is concerned with nautical surveys and the construction of charts; he is also in charge of the protection of merchantmen, and of fishing, and of all that concerns the police at sea. The maintenance of discipline and the granting of leave of absence to officers and men also falls to his domain. On the structure of new ships he exercises a weighty influence, as he indicates to the Third Lord, to the Naval Constructor, and to the Superintendent of the technical department, the main requirements of the ship about to be built; the same holds good with respect to the artillery of the navy and torpedo-armaments, which belong to another department.

The duty of the Second Naval Lord, who, as a rule, is also a Vice-Admiral, consists mainly in manning the fleet both with seamen and technical experts; also with marines and artillery, both in times of peace and of war; he is further responsible for the naval reserves &c. He superintends the education of officers and the training of the whole force, inclusive of the schools and other training establishments. Accordingly he is in close contact with the Senior Naval Lord, although subject and responsible only to the First Lord.

The Junior (4th) Naval Lord, to mention him at once, attends to the transport, the medical and the victualling departments, inclusive of the hospitals ashore and afloat; he controls also the employés of

the hospitals and the lower officials on board, such as clerks, stewards &c.; the ships' libraries, uniforms, allowances, bounties and prize-moneys, naval savings-banks, pensions of crews and of officers' widows and the like, are all under his charge, and finally to keep him in contact with the active navy, he is entrusted with the provision of coals for the ships, so that he remains in constant touch with all the ships in commission, and with the coaling-stations both at home and abroad.

These three Naval Lords then are employed principally with the ships in commission and their crews. On the other hand the domain of the Third Naval Lord, also a Rear-Admiral, comprises the whole material of the navy in ships and appurtenances; to it belong all the technical concerns and institutions; his title from of old is "Controller of the Navy,"—corresponding to the whilom "Director of the Naval Department" of Germany, ere this department had been broken up into three independent sections. Contrary to the other sections of the English Admiralty, which represent some odd matters not here enumerated, the composition of this large section is perfectly uniform comprising, as it does, ship-building, the construction of machinery, the arming of artillery and torpedoes, the stores for all technical purposes, the operations and administration of the yards, and the audit of the accounts of the yards. The drawings for new ships, planned according to the requirements agreed upon between the "Controller" and the "Senior Naval Lord," are made in this section by the Director of Naval Construction jointly with the "Engineer-in-Chief of the Navy," who is not subordinated to, but co-ordinated with him, and with the Director of Naval Ordnance. This Department also orders and superintends the building of ships. If this is carried on in a Royal yard, the ship remains, from the first projection of it till its completion, within the domain of this department, whereby due uniformity and rapidity of construction is secured. The same holds good of all conversions and repairs.

The Controller is responsible for the superintendence of ships and machinery made according to contract in private yards; he also examines merchant-steamers as to their fitness for auxiliary-cruisers in case of war, and finally his sphere of activity includes also all the arrangements of the naval dockyards and victualling yards both at home and abroad.

The chief of this large and important department, for which in the current year (1898/99) £13,597,000 have been voted, formerly.

held a subordinate position; it was only in 1869 that he was made a Lord of the Admiralty; three years afterwards he was withdrawn again from the Commission, but after an interruption of 10 years he was finally reinstated in that position, he being one of the most important members of the central authority.

According to the requirements of the extensive range of business of this department he has not, like his colleagues, a secretary, but a large office, in a certain sense a central section of the department, employing a secretary as chief of the office, and 8 senior and 33 junior officials and writers.

The SIXTH or CIVIL LORD finally, a Member of Parliament, has the superintendence of the works department inclusive of the purchase of land in London, in the naval ports at home and abroad, and of the stations of the coast-guards &c. To him moreover are submitted all special questions about gratuities and pensions of all the employés in the navy, as well as the concerns of benefit-societies, dockyard and similar schools, and the like.

Whilst the different branches of the service of the navy are thus more or less systematically apportioned to the five Naval Lords subordinated to the First Lord of the Admiralty, a distribution has become customary with respect to the *personal concerns* of officers, engineers, medical officers, warrant officers, and officials, which has no parallel in the navy of any other nation. Elsewhere these are as much as possible managed in a *single* special section, but in this country they are allotted to all the six Lords, so that each has a portion of the patronage, which for centuries has played a large part in the party-government of England.

The lion's share is reserved for the First Lord, who regulates the promotion and discharge of all officers of the navy, distinctions and rewards, the orders to the admirals and all commanders of ships, the commanders of the coast-guards and senior surgeons, the appointment of midshipmen and of candidates for paymasters, and the appointment and promotion of officials of the Admiralty and elsewhere, stationed in London.

The Senior Lord commands the senior officers of the ships; the Second Lord the navigating officers, and watch keepers, the sub-lieutenants, midshipmen, and naval cadets, the engineers and the gunners and boatswains (warrant officers); the Fourth Lord, the naval chaplains, the instructors, the doctors, exclusive of those reserved for the First Lord, paymasters, assistant paymasters and candidates and

the carpenters (warrant officers). The Third Lord and controller appoints the technical officials in the yards, and the Civil Lord attends to the appointment, promotion, pensioning, and other affairs of the remaining officials in the naval establishments on land, excepting those of the Admiralty and elsewhere in London, and those apportioned to the Controller.

In addition to the Lords of the Admiralty and in a similarly independent position, but not members of the commission, the governing body of the Admiralty that changes with the ministry, includes the PARLIAMENTARY AND FINANCIAL SECRETARY, who is a non-expert, but is selected from among the good debaters in the house, and discharges the function of chief administrator of the finances. He is responsible to the First Lord for the correct drawing up of the budget and for all the expenditure of the navy; it is therefore his duty to look into every new or unusual demand; he has to examine all the items of expenditure, to audit the accounts, wherein he is aided by the Accountant General, a high-placed official who has a large staff under him. He is especially to superintend the purchase and sale of ships, stores &c., the payment of chartered auxiliary cruisers and the like. Moreover he is the channel of communication between the Chancellor of the Exchequer and the treasury, and it is his business to support the First Lord in representing the navy in the House of Commons.

The First Lord is assisted by three secretaries, a Post-captain and two higher officials, and each of the other Lords, with the exception of the controller, has one secretary. The real official work of all these governing bodies is concentrated in a large central section, presided over by the PERMANENT SECRETARY of the Admiralty, an eminent official of great influence, who, as his title indicates, does not change with the ministry, but keeps his post permanently. He receives and sends replies to all written communications, is the channel of communication between the Lords of the Admiralty and the different sections, and he sees to it that affairs are not settled one-sidedly, but that all branches of the service should co-operate. He signs all the orders and regulations of the Admiralty in their name. He keeps the minutes of the Commissioners, and accordingly is present at all their meetings and is cognisant of all their transactions. Being the only administrator that is permanent, he preserves the traditions of office and is the means of communication between the outgoing and incoming Lords at a change of ministers.

Accordingly this central section is not limited to a single office, be it of registration, or records, or archives, but in addition to these three comprises four subsections, viz:

1. A Military Branch, dealing with putting ships in commission and laying them up in reserve; also with their employment and distribution; and with the management of the police at sea to protect commerce, fisheries &c.: in short all the affairs, for which the Senior Naval Lord is responsible. In this office also is conducted the political and secret correspondence, and in case of war the guidance of the operations would proceed from this subsection;

2. A second, called the "Naval Branch" for no particular reason, whose sphere of activity corresponds to that of the Second Naval Lord, and accordingly comprises the manning of the fleet, inclusive of the marines, coast-guard, and reserves of officers and men, their appointment, training &c., till they are discharged.

3. A third, called the "Civil Branch," which deals with the concerns of pensioners and of non-combatants, a class of men which includes even naval officers employed in the service of the Admiralty &c.

4. A Legal Branch, which deals with matters of disciplinary punishments, courts-martial, and other tribunals bearing on discipline, prisons, and the like; also with questions of law concerning blockades, prizes &c. and with the regulations of service, and with matters of uniforms, flags, and the like.

An idea can be formed of the extent of business of this central section from the numbers of officials employed, there being 68 of them, besides the Private Secretary.

The "Department of the Secretary of the Admiralty" is accordingly the organ of the Lords Commissioners, and especially of the First Lord of the Admiralty in all dealings with the navy and other government offices, and in all those communications with naval authorities at home and in foreign countries, which the individual Naval Lords or chiefs of sections are forbidden to hold directly; all commands, orders, and written instructions of the Admiralty not pertaining to its other sections are drawn up in this office. There are eight such sections (besides that of the technical department, which holds an independent position). Primarily there are two under the Senior Naval Lord, viz:

1. The NAVAL INTELLIGENCE DEPARTMENT directed by a naval Captain or a Rear-Admiral. This office was only created in 1882, and two years afterwards was enlarged and divided into two subsections. The

first of these is charged with collecting and scheduling for ready use all the information obtainable about foreign navies; their resources; preparedness for warlike operations; and the distribution of their vessels on the several stations, as well as their arrangements for coast-defence. The other is concerned with the home preparations for war; with mobilisation and elaboration of plans of campaign for all possible eventualities; as well as plans for the manœuvres of the fleets in times of peace. The experience derived from these is tabulated in this office for the use of the Admiralty or the Lords Commissioners, and under their direction the needful information is conveyed to the commanders of fleets or squadrons. The chief of this section makes an official report to the Admiralty upon occurrences bearing on the conduct of war, but plans of operations he submits only if requested to do so; he holds a purely consultative position, and the *personnel* of his section is not regarded as belonging to the Admiralty-Board, especially as, exclusive of half a dozen officials, it consists only of six staff-officers drawn from the corps of naval officers, and of four officers of the Marines.

From the labours of this office, which may be designated as the labours of the staff of the Admiralty on behalf of the navy, the Admiralty derives the bases for calculating the needful strength and composition of their own navy, its preparedness for and employment in war. It characterises the former standpoint of the governing body that the Intelligence Department is only 15 years old.

2. The HYDROGRAPHIC DEPARTMENT, under the Hydrographer of the Navy, who as a rule, is a Rear-Admiral; this office is related to the former in that it furnishes charts, which form the basis of strategical operations. It is not of recent creation, but has existed these 100 years (1796), and the office of the Royal Hydrographer dates back to the times of the Stuarts. The duties of this office are to make surveys and do other scientific work pertaining to navigation, and it keeps permanently employed a flotilla of ships and vessels in home and foreign waters. It edits and publishes charts, sailing-directions, and information for the use of navigators, also lists and descriptions of lighthouses, and tide-tables for every sea; it supplies the vessels of the Navy with these publications, also with chronometers, mariner's compasses, and nautical instruments and appliances of every kind. The Hydrographer moreover advises the Admiralty in all that concerns surveys and nautical affairs, inclusive of pilotage, as well as on keeping the naval ports in fit and proper state; he is to keep abreast with

the hydrographic work of foreign navies, and finally aids in the work of the observatories of Greenwich and of the Cape, and in the preparation of the Nautical Almanack. The staff of this section consists of 12 staff officers, seven of whom are naval officers and five belong to the navigating branch in process of extinction, and one lieutenant. Moreover the office employs a senior paymaster as civil assistant of the director, nine draughtsmen, five officials, and a writer; 29 persons all told.

The SECOND Naval Lord also superintends two sections, viz:—

3. The ROYAL MARINE OFFICE presided over by a lieutenant-general of this corps, as substitute for an adjutant-general. He is to watch over the drilling and training of the Marines, keeping their ranks full so as to have them constantly in readiness for embarkation on board the men-of-war, of the armament of which they form an integral part. In the year 1896/97 the total number of Marines provided for in the budget amounted to 15,861 men, of whom 2870 were artillery-men, 12,697 light infantry, the rest belonging to the staff and the dépôt. This office is distinguished from all the other offices of the Admiralty in that it consists only of military men, viz: of two colonels as assistants of the chief, two majors as quartermasters, and seven subalterns. This is connected with the peculiar organisation of the marines, of which we shall treat further on.

4. The OFFICE OF THE ADMIRAL SUPERINTENDENT OF NAVAL RESERVES, presided over by a flag-officer, at present a Vice-Admiral. He is to provide for the manning of the fleet, organizing, inspecting, and if need be, mobilizing the *personnel* of the second line of defence; for that purpose he is in command of (a) The Coast-guard, (b) the Royal Naval Reserve, and (c) the Seamen-Pensioner Reserve. Details about these organisations will be given further on under the heading "*Personnel*." This admiral is also chief of the Reserve Squadron, which consists of nine coast-guard ships stationed in different ports of the United Kingdom—battleships of older type or large cruisers, which are permanently in commission, but with reduced crews and serve as head-quarters for the coast-guards in the nine districts into which the coast is divided for that purpose. His flag flies on the battle-ship "Alexandra" in Portland. This squadron, which the Admiral Superintendent of the Naval Reserve is able to man within a very short time, forms the First Naval Reserve of the fleet; its duty is to protect the coast in case of a sudden declaration of war, if perchance the Channel fleet should happen to be just then off the Spanish coast,

or in the Mediterranean, or in Madeira, and for that purpose this squadron of the Naval Reserve would be immediately concentrated on the south coast.

The office received its present organisation in December 1874. Its staff consists of a naval captain as assistant, and two paymasters as secretaries, together with five civil officials. For active service the admiral can also dispose of the staff of his flagship.

The FOURTH Naval Lord of the Admiralty superintends the work of the medical men and chaplains of the navy, as well as the transport and the victualling services.

5. The DEPARTMENT OF THE MEDICAL DIRECTOR-GENERAL OF THE NAVY was created in 1832 by Sir James Graham when he reorganized the Admiralty; at the head of it he placed the *Chief-Physician* of the Navy, who then received the title of the "Medical Director General of the Navy." He is responsible for the due performance of the medical duties on board and ashore, both at home and in foreign possessions; also for the administration of the hospitals, and he advises the Lords Commissioners on all medical and sanitary affairs both personal and material. The medical men and the *personnel* of the hospitals, and on shore the nurses also are under his control; he regulates and watches over their training and their duties, and the due discharge of the latter. In him is vested the whole inventory and material of all the naval hospitals at sea and ashore; he has to provide for the renewal of plant, and is to have stores in readiness for the use of all the sanatory establishments of the navy. As these amount to no less than 25, of which 13 are abroad, that of Malta alone requiring in 1888 to pack and hold ready for immediate shipment the necessaries for 15,000 men (and this is doubtless exceeded at present), some approximate conception may be formed of the enormous extent of the duties of this office. Moreover, the Director-General has to control the expenditure for salaries and wages of the *personnel*, for drugs, and other stores; he has to scrutinise the accounts, wherein he is assisted by a special branch in this office. He does not actually *purchase* the stores, but he sends in his requisitions to the financial section to be described hereafter.

This section (the medical) also examines the provisions for the fleet, the surgeons receiving special instruction on this subject previous to their embarkation; finally has to draw up a yearly report on the state of health in the navy.

Sanatory institutions of the navy are found under various names

In the United Kingdom, at Haslar (near Portsmouth), at Portsmouth, Plymouth, Chatham, Yarmouth, Sheerness, Portland, Dartmouth, Walmer, (near Deal) and Haulbowline (near Cork); abroad at Gibraltar, Malta, Ascension; at the Cape, at Trincomalee (Ceylon), Hong-Kong, Yokohama, Sydney, Esquimaux (Vancouver Island), Coquimbo (Chile), Port Royal (Jamaica), Bermuda, and Halifax (Nova Scotia). Moreover there are contracts made for the accommodation in case of need of patients in sick quarters, in a large number of places in the United Kingdom, and in some foreign cities.

The staff of the Director-General comprises 2 physicians of eminence, 3 senior and 13 other officials.

6. The RELIGIOUS SERVICE OF THE NAVY is superintended by the Chaplain of the Fleet and Inspector of Naval Schools; he has to watch over 102 Anglican Naval Chaplains, most of whom also act as Naval Instructors, and 29 Naval Instructors. Three quarters of these are on board ship and the rest are distributed in hospitals, prisons, schools &c. ashore. He is subordinated in his official capacity to the Fourth Naval Lord, but with respect to the Naval Schools to the Second Naval Lord. In the office he is assisted by a Head Schoolmaster.

Only two of the Naval Chaplains are Roman-Catholics; these are not on board, but are stationed in the two large Naval Ports, Portsmouth and Devonport.

Of larger dimensions is the work of the NAVAL TRANSPORT OFFICE. A section to regulate the transport was instituted as far back as 1689, at the time of the war in Ireland against James II. after he had been deposed; then abolished again in 1724 during the long peace following upon the War of the Spanish Succession. Abuses having crept in, it was re-instated 70 years afterwards at the beginning of the war against Revolutionary France, and subsequently enlarged by being charged also with the care of the sick and wounded. After the dethronement of Napoleon (in 1817) it was once more abolished, and its duties committed to the Victualling Office; but when the Crown had taken over the government of India from the East India Company, and when in consequence of the enormous expansion of the British Colonial Empire the work of transport had assumed vast dimensions, it was found necessary in 1862 to form a special section of the Admiralty for its administration.

7. The DEPARTMENT OF THE DIRECTOR OF TRANSPORTS is supervised by a senior naval captain. It is his duty to provide for the transport

of officers and men, as well as of other persons attached to the army and navy; also of stores for *both* branches of the service to and from the colonies and India—the latter occupying, under the Secretary of State for India, a separate position with a management of its own—and he has to watch over all the expenditure referring thereto. Considering the number and extent of England's possessions abroad, and that these are hardly ever free from little wars in one place or another, it is obvious that this office has an extensive sphere of activity, which may under circumstances be greatly enlarged.

The Director is supported by two assistants, a naval captain in military affairs and a higher official in the actual administration, and moreover by four inspectors of ships, two of whom are former chief-carpenters. The rest of the *personnel* of this office consists of 19 officials engaged in the administration, and 4 writers &c; in all 29 persons.

8. The VICTUALLING DEPARTMENT, charged with providing the navy with provisions, clothes, &c. Wholesome and abundant nourishment is the first necessity for the efficiency of ships and fleets. For want of that, many an enterprize has in former days been wrecked; fleets have been unable to keep the sea, and crews have perished by thousands; in no other branch of the navy have such gross and disastrous abuses occurred as just in this particular department.

In the times of Queen Elizabeth the victualling was generally put out to contractors, and the consequence was, that immediately after the defeat of the Armada, the fleet was reduced to impotence by disease. The failures of the great expeditions of Charles I. are mainly to be attributed to the shortcomings of the victualling department; the same was the case with Admiral Hozier's expedition to the West Indies in 1727, and during Anson's circumnavigation of the world the men died by hundreds. At the blockade of Brest and Rochefort in the Seven Years' War, Admiral Hawke had incessantly to struggle against the gross mismanagement in the victualling department, and not till towards the end of the 18th century was a sensible improvement effected in the care of the health of the crews by the energetic action of Admiral Jervis. But the practice of depriving the men of meat for three days in the week was not abolished till 1824.

The shortcomings of the Victualling Department were to a large extent due to bad organisation. In 1832 the Victualling Commission was dissolved, and its duties entrusted to an office with a single

eminent official at its head, who was directly responsible to one of the Naval Lords of the Admiralty. This is the arrangement existing in all its essentials to this day, few changes having since then been made, as for example the severance in 1862 of the transport work from the victualling office, with which it had been connected.

The Director of Victualling is charged with supplying, storing, and preserving, the needful provisions and wearing apparel for the navy (but not the uniforms of the marines), inclusive of table furniture and other crockery; also the books of the ship as well as the requirements of internal lighting; moreover he has to control the work of the victualling yards and dépôts at home and abroad; he appoints and employs the officials, and checks the accounts of the distribution of the stores. Like all other officials he is bound to forecast his requirements for the year a long time in advance; but considering the enormous consumption of the fleets in all the seas, the rapid changes of requirements due to frequent change of numbers, the waste inevitably caused by climatic and other influences, and the uncertainty of the harvests which have to be taken into account, this task is one of quite unusual difficulty, which is still further increased by the regulations that on board the men may claim to receive money in lieu of some of their rations in kind, and that marines on shore receive the rations of soldiers, and on board those of sailors. With respect to the requirements to be anticipated on the different stations of the fleet, the Victualling Department must communicate with the Intelligence and the Transport Departments. The Director of Victualling does not however purchase the stores; this is done by the financial section exactly as in the case of the supply of the requirements of the medical section.

The home victualling yards are at Deptford, Gosport, and Plymouth, near the three great Naval Dockyards; there is also at Haulbowline a small victualling yard connected with a small dockyard. The foreign yards, 13 in number, are at Gibraltar, Malta, Ascension, the Cape, Bombay, Trincomalee, Hong-Kong, Sydney, Esquimaux, Coquimbo, Port Royal, Bermuda, and Halifax. All the stores purchased pass through one of the yards, where they are examined by special officials and rejected if found imperfect. Of some stores like ship-biscuit, oatmeal, cocoa, mustard, and pepper, the *whole* requirements of the fleet are prepared in the victualling yards themselves. The principal yard is at Deptford, where all these articles are produced and where most of the provisions, as well as the clothing purchased, are delivered;

Gosport and Plymouth also bake ship-biscuit, and the latter prepares oatmeal as well.

The distribution of the stores from the yards and depôts to the ships is not regulated by the heads of the several departments; they have merely to comply with the requisitions of the Commandants and Commanders of Squadrons, who are responsible for the efficiency of their ships and have to render account of their stores; nevertheless the Director of Victualling is not without some means of exercising a certain control, as he knows from experience the requirements of ships in all seas and under all circumstances, and all the accounts are submitted to him and he forwards them to the Court of Accounts. It is interesting to know from the experience thus gathered that the waste of stores on board ship amounts on an average to one per cent of the whole total of the stores.

In the Victualling Department there are employed besides the Director, 35 officials, 12 of whom are of superior rank.

Having now described these eight departments, which have to deal with the vessels in commission and their *personnel*, and who are responsible, as already stated, to the Senior, Second, and Fourth Naval Lords (who, in consequence, have to hold frequent communications), we have yet to consider the organisation of the TECHNICAL DEPARTMENT, which forms a distinct, separate unit under the THIRD NAVAL LORD AND CONTROLLER. Its function is to prepare and keep in a state of efficiency all the MATERIAL of the fleet, so as to be fit for immediate use in case of war. The department consists of six branches: for the designing and building of ships, of marine engines; also for the armament of vessels, for the service in the yards, for the administration of the stores in the yards, and finally for checking the expenditure in the yards. For brevity we will designate them as follows: (1) Constructive, (2) Engineering, (3) Naval Ordnance, (4) Dockyards, (5) Naval Stores, (6) Controller's Accounts, and their several heads, as Directors of the same.

1. The CONSTRUCTIVE BRANCH, whose head is the Director of naval construction and who also happens to be just now the Assistant Controller, and in the Controller's absence his representative in all matters not referring to the artillery. This official has to design all the ships of the navy, as well as the machinery and contrivances for the artillery &c., and has to watch over their construction; he is also responsible for the efficiency of the ship in coming up to the expected performance

The mode of procedure is as follows: The Lords Commissioners, chiefly the Senior Naval Lord and the Controller, fix the requirements of any new ship about to be built; on receipt of the instructions of the latter the Director of naval construction designs, jointly with the Engineer in chief and the Director of Naval Ordnance a corresponding *Sketch*, and passes it over to the Controller, who submits it with the needful explanations to the Lords Commissioners of the Admiralty. If this is approved either with or without modifications, then the Controller returns it to the Director of ship-building and orders that *Plans* be designed; this must be done jointly with the above named heads of sections who indicate their consent by their signature of the plans. These are now, together with a complete description of the ship and of its expected performance, handed by the Controller to the Permanent Secretary to be circulated among the Naval Lords for their inspection; next the Lords Commissioners hold a meeting for final discussion and approval or modification, as the case may be. When the Lords Commissioners have passed the plans of a ship and have had them stamped, then no alteration of any kind can be made without their express consent. The plans with the needful specifications and indications of weight are now handed over to the building-yard, where the lines are laid down in the moulding loft and the working drawings are made accordingly, which in all that concerns the armament and fighting gear of the ship are to be inspected and approved of by the respective ordnance officers &c. on the spot. From the yard these drawings are forwarded to the Admiralty to be examined by the Director of ordnance, the Controller, and eventually by the Senior Naval Lord, and passed with or without modifications as the case may be. Meanwhile the Director of the constructive branch jointly with the Engineer-in-Chief of the Navy prepares a *Preliminary* estimate, which is worked out in detail by the dock-officials; at the same time the contract and purchase department of the Admiralty prepares the contracts for the supply of the materials needful for the construction of the ship and, if approved of, the contracts are concluded. As soon as the materials are delivered in the dockyard, the work is taken in hand and superintended by the superintendent of the yard, who is in charge of it; but the progress of the work is to be incessantly watched by the Director of Naval Construction himself or by his assistants, so as to make sure that the execution exactly tallies with the original plans.

This applies to the building of ships in the Royal dockyards. Some

modifications are made with ships built in private yards, the most important of which is that the exact cost of the ship is determined, before the building is taken in hand, and the Director of Naval Construction is as answerable for these ships as for those built in the Royal yards. He is therefore entitled to visit the private yards in question either personally, or by officials of his department, so as to determine their productive capacities. He proposes the yards that should be invited to send in tenders, and has the work watched by one or more officials stationed on, the spot. In those factories where steel-plates, armour plates, and anchor chains are made these officials are stationed permanently.

In the discharge of these duties the Director of Naval Construction is largely aided by the Royal Corps of Naval Constructors, of which he is the Head. This corps was first formed in 1883 for the purpose of securing a larger number of thoroughly educated experts in naval construction, with which the navy up to then was but scantily supplied. Up to then mere mechanics were employed in ship-building, and no provision was made for their further training, but now gifted lads, who have received a good school education, have a higher career opened to them. Their technical training begins with five years' service in the dockyards, where the student is taught practical ship-building by passing through all the shops; then follows a three years' course in the Naval College at Greenwich, nine months of each year being devoted to the study of the theory of engineering, and three months to practical work in certain yards. When the student has passed his examination he is appointed Assistant Constructor of the Third Class; all subsequent promotion is made by selection. The Corps at present numbers 72 members in 6 grades; most of them are employed in home yards, four in the yards of Malta, Hong-Kong, and Bermuda; four of the elder ones are employed as additional advisers to the Director of Dockyards and to the Superintendents of the three great naval dockyards, two as Instructors in the Naval College of Greenwich, a few more in other special offices, and about 20 belong to the ship-building section of the Admiralty and accordingly are at the disposal of the Director of Naval Construction. Frequent changes of place occur between them and their colleagues employed in the dockyards.

When a ship built in a private yard is finished, it is brought to one of the three large naval dockyards, where it is armed and fitted out and tested by a series of trials as to stability, seaworthiness, speed, manageability in manœuvring, efficiency of the armament &c., in short

as to its entire capacity for warlike service. The Director of Naval Construction is to make sure, either personally or through his officials, that the terms of the contract have been fulfilled. Barring this latter investigation ships built in the Royal dockyards are subjected to the same tests as those built in the private yards. Next, the Director of Naval Construction reports to the Controller on the ship's performance and capabilities, by drawing up a detailed description of it containing all that is worth recording, especially as to her stability; and this report, accompanied, if need be, by advice about the manipulation of the vessel, is passed on to the officer in command, when the ship is put in commission. This puts the commanding officer in possession of a fund of information such as—according to the statement of the present Director himself—is nowhere else secured.

Supplementary alterations in the construction and appointments of ships as well as larger repairs require the approval of the Director of Naval Construction, who has also, jointly with the Engineer in Chief to make inspection and valuation of ships about to be purchased, as well as of steamers of the commercial navy, that are to serve as auxiliary cruisers in war, and to make a report on them. Jointly with the Director of Naval Ordnance he has to make arrangements for their eventual armament. With reference to the materials for ship-building he has, together with the Director of Stores and Dockyards, to consult the Controller, and has also a voice in fixing the salaries of the men under him. To keep himself abreast of the times he is to obtain, independent of the Intelligence Department, the widest possible information on all the occurrences, improvements, and inventions in shipbuilding at home as well as in foreign countries.

It will be seen that the sphere of activity of the Director of Naval Construction is both very extensive and highly important; for all the floating material of the navy he is the first and nearest counsellor of the Controller; on many points however he has to act jointly with the Directors of other branches, principally with the "Engineer in Chief of the Navy". The latter has risen to his present post from the branch of Engineers, and its present occupant still holds the rank of Chief Inspector of Machinery. Engineers trained in the construction of machinery, that is to say officials who had a University education, and who do not belong to the navy, but are still employed in the dockyards and in the admiralty, such as Germany has and indeed also England in her Corps of Naval Constructors, are not known in the English engine factories. All the higher posts are filled by mem-

bers of the corps of mechanical engineers of the navy, that is to say by naval men, of whose training we shall speak later on. That is why the Engineer-in-Chief and all the engineers of his section, as well as those employed elsewhere on land are, according to English practice, sent on board of ships stationed in ports.

Of late the position of the Engineer-in-Chief has greatly risen in importance, both on account of the greater complexity and of the greater number of engines used on board. On large vessels it sometimes happens that more than 100 auxiliary machines are in use for moving the iron-clad turrets or heavy artillery, for weighing anchor, lowering boats, working search lights, for internal lighting of the vessel, &c. For all these appliances, and indeed for the due discharge of all his duties, the Engineer-in-Chief is responsible to the Controller. For planning the positions of the armament and placing it, for the apparatus for launching the torpedoes, and for the electric lighting of the ships and boats, he is jointly responsible with the Director of Naval Construction and the Director of Naval Ordnance. He renders assistance to the Director of Dockyards in maintaining, improving, and extending the machinery for the work in the yard, in repairing and altering the machinery on such ships and boats as are under his charge. His co-operation with the Director of Naval Construction in all new ships to be built has already been spoken of above; we have only to add that he is not subordinate to the Director of Naval Construction, but is co-ordinate with him.

The mode of procedure in the construction of new machinery, work which is comparatively new in the Royal dockyards, is similar to that adopted in the building of new ships. The Engineer-in-Chief makes a general sketch with specifications, for which tenders are invited from a limited number of selected firms of established reputation. As a rule the contract is given to the lowest tender, and with ships built in private yards the same firm as has the building of the ship is nearly always chosen. Next the builders make precise drawings of the machinery to be examined by the Engineer-in-Chief, who superintends the construction by having it looked into, either from time to time or even continuously.

All the trials of new machinery fall into the domain of the Engineer-in-Chief, and he superintends their working on board; for although the mechanical engineers on board are subject to the naval commanders alone, yet all the reports about the machinery are sent to him, and as head of the branch of mechanical engineers, he exercises a

considerable personal influence. In his latter capacity he serves as additional counsellor to the Senior Lord of the Admiralty in all the concerns of his corps; he proposes all orders to be issued, and superintends the training of candidates and the corresponding training institutions. In the section for machinery there are employed besides the Director, 15 engineers of various degrees.

2. THE ORDNANCE DEPARTMENT. The administration of the armament of the navy has passed through various phases, which are characteristic of the former want of logical procedure, and of the position of the navy and army towards each other. As far back as the beginning of the 16th. century an Artillery section for the Navy was organized, but in the last century the duties of this office were entrusted to the Director of Ordnance, and in 1855 to the Minister of War, a Member of Parliament; consequently the estimates for artillery &c. of the Navy were included in the Army-budget, but not without largely cutting down (up to 45 per cent) the demands made by the Admiralty.

The War Office was, however, unable to keep pace with the rapid expansion of naval artillery which had already set in even then, such as: the transition from comparatively light, smooth bore to heavy, rifled guns; from short muzzle-loaders to long breech-loaders and so on, and great delays occurred in the delivery of artillery to new ships, and altogether English naval artillery remained so far behind that of other maritime powers, that even now many English battle-ships¹ are armed with *Muzzle Loaders*. The Admiralty had no information about the available store of ammunition. In spite of these obvious disadvantages this arrangement remained in force till a few years ago, when the Artillery works at Woolwich and the Royal factories of ammunition &c. were placed under a Director General, who has to satisfy as far as possible both the demands of the Admiralty and of the War Office, but is subject to the latter alone.

Proposals for the ordnance are made by a joint committee of military and naval officers and civilians, and this committee is also subject to the War Office; the military authorities are also charged with the delivery of the artillery and ammunition prepared for the navy. The estimates for artillery &c. of the Navy are now included in the NAVY ESTIMATES, and since 1891 the ADMINISTRATION of the ammunition and other artillery stores for the Navy has been transferred to the Admiralty, a special section, the NAVAL ORDNANCE STORE DE-

¹ Only obsolete ships. The translator.

PARTMENT, having been created for that purpose and subjected to the Director of Naval Ordnance. This section is charged with keeping in readiness on all home and foreign stations the ammunition for war purposes needful for ships and coast batteries. It consists of a Colonel, who works under the Director of the Department, a Major, 6 senior, and 31 junior officials and writers.

This is the present arrangement. As the Admiralty has the disposal of the moneys voted for the armaments, they do not restrict their orders for guns &c. to the Royal factories, but also largely employ private firms, principally that of Lord Armstrong, at Elswick near Newcastle. In the Admiralty, the technical department, the ordnance branch, is managed by a naval captain, the Director of Naval Ordnance and Torpedoes, who has under him a second official as Assistant in the torpedo and mining sections, and a third as Inspector of ammunition, &c. The Director of Naval Ordnance is responsible to the Controller for the due equipment of the fleet with guns, ammunition, torpedoes, and all appurtenances needful for the utmost efficiency of the whole armament.

From the earliest sketch of the design for a new ship till after the trial of the guns, the Director of Ordnance is constantly to remain in touch with the Director of Naval Construction concerning the placing of the guns, fitting up of the ammunition store-rooms, arrangements for the supply of ammunition &c., and with the Engineer-in-Chief concerning the gun-carriages, the mechanism for moving the guns and torpedo-tubes, &c. The drawings referring thereto are to be signed jointly. He is to keep the Naval Ports at home and abroad supplied with sufficient stores of ammunition &c. He advises the Controller in all that concerns the artillery and torpedoes, especially with reference to the introduction of new types of guns or other improvements, on all of which matters he is expected to possess the latest information; he is in continuous communication with the Director of Ordnance in the War Office concerning the supplies for the navy; it is his duty to watch over the education of the students in the gunnery and torpedo training ships and similar institutions, also over target practice, laying of minefields, working of the guns in coast-batteries, and to make verbal reports to the Senior Naval Lord as necessity arises; he holds direct communication with the captains of the gunnery and torpedo training ships on all technical concerns.

His assistant in the section for torpedoes and mines, which includes also search-lights, stands in the same relationship to him as he himself

stands to the Controller. Independently of the Naval Intelligence Department he is also to make himself acquainted with all that occurs in his sphere both at home and abroad; he is to be present at the practising and is to submit plans for torpedo-boat practice and manœuvres, and he is to do all in his power to promote progress in the use of his arm, especially in the tactics of torpedo-boats.

The staff of this section includes also three commanders and one lieutenant acting as assistants of the Director, and four gunners of the navy.

3. The DIRECTOR OF DOCKYARDS is subject to the Controller and superintends the administration and the work of the yards and naval depôts both at home and abroad. This post has only lately been created. In the place of the former unsatisfactory state of things an Inspector of Dockyards was appointed in 1872, and he was subordinated to the Director of Naval Construction. As this did not altogether turn out well further trials were made, till at last in 1886 the present section was organised; its independent position, subject only to the Controller himself, is justified by the extent and importance of its sphere. There are no less than 26 yards and naval depôts, seven of which are in England, one in Ireland, and the rest (18) abroad.

The large yards, which are used for the building and equipment of ships and accordingly constitute the most important parts of the large naval ports are:—In England; Portsmouth, Devonport, and Chatham, inclusive of the smaller annex at Sheerness. Abroad, on a somewhat reduced scale; Malta, which serves as the main base of operations for the English fleet in the Mediterranean and is equipped accordingly. The yard at Pembroke, in the excellent port of Milford Haven in Wales, is used for ship-building exclusively. In Ireland there are only the small yards of Haulbowline (usually known as Queenstown), which have floating docks and dry-docks. The foreign yards or depôts at Gibraltar, Bermuda, Halifax, Port Royal in Jamaica, the Cape, Bombay (for the Indian navy), Trincomalee, Hong-Kong, Sydney (for the Australian navy), and Esquimaux are used as stations and bases of operations for the several squadrons. At Deptford there is a depôt for several sorts of stores; in Portland, Antigua (West Indies), Ascension, St. Helena, Sierra Leone (West coast of Africa), Suez, Samarai (Dinner-Island), New Guinea, and Yokohama there are coaling-stations.¹

¹ To these must now be added Durban in Natal; "the Government of Natal

The Director of Dockyards has to supply all these yards &c. with the stores necessary to meet all eventualities; and he has to provide for the careful preservation and distribution of the stores by fit and proper officials; above all he is to conduct skilfully and economically the very extensive operations of the large yards, where warships of every kind from the largest down to gun-boats (exclusive however of torpedo-boats), and of late also some naval machinery, are constructed; where repairs and alterations of vessels are made, and ships laid up in reserve are kept in fit state of repair, and where, finally, all the stores needful for the equipment of these ships, and for making good any waste, are held in readiness. The Director is responsible for the rapid progress of work done, and in order to keep himself well informed on every point he is expected to pay frequent visits to the dockyards at home; one of his most important duties is to draw up the shipbuilding programme for the coming financial year. Although the Superintendents of dockyards are senior naval officers and those of the four principal dockyards are admirals, yet the Superintendent of the dockyard has no executive authority, his staff consists of two ship-building and two mechanical engineers, two officials, and five writers.

4. The NAVAL STORE DEPARTMENT, under the Director of Naval Stores, was created in 1832, as part of the great reform of the Admiralty; after passing through several changes it received its present organisation and independent position about 10 years ago. Its duties are:—to keep up the supply and to watch over the distribution of the stores required for building, fitting, repairing, and equipping men-of-war, and to keep these in fit and proper condition, whilst in commission at home as well as in foreign yards and depôts; exclusive however of their armament; it has further to attend to the stores of the different naval Colleges at Greenwich, Portsmouth, Dartmouth, and Keyham; also the naval barracks, of stations and vessels of the coast-guard, of training ships for the mercantile navy, of the auxiliary-cruisers, of batteries for the Naval Reserve and of Naval Prisons &c. Considering the great number and distances of the wharves and the frequent and rapid change in the state of affairs, e. g. with respect to the new ships to be built, or of the ships in commission, it is clear

is prepared to supply free of cost 12,000 tons of steam coal annually to ships of her Majesty's Navy calling at the Port of Durban." Telegram of the Officer administering the Government of Natal to the Colonial Secretary. Standard April 6th 1898. The translator.

that great watchfulness is required both in keeping constant supplies ready and in making the estimate for the coming budget. Moreover, the Director is bound to scrutinise and approve the accounts for plant and materials of the ships, wharves, and prisons, to supply information on them to the Controller and to the treasury, and to submit to the Controller and Financial Secretary schedules of the stores on hand, every deficiency of which must be immediately reported to the Controller. With respect to the supply of coals for the fleet he is subject to the fourth Naval Lord; in the discharge of this important duty he is under the necessity of keeping himself fully informed about the movements of the ships and their consumption of coal, and every month he is to submit a report thereon to the Board of Admiralty. The Director is an official at the head of 18 higher and 26 lower officials and writers; in all of 44 persons.

5. The ACCOUNTS BRANCH, under the Inspector of Dockyard-Expense-Accounts, was only created in 1886 and was subjected then to the Auditor-General, but in 1887 to the Controller, in order to give to those who advanced technical demands an independent position with respect to the administration of their own finances, and to have the distribution checked by experts. The Inspector must carefully calculate and watch over the distribution at the yards, and over the correct, clear, and speedy rendering of accounts, so that both he and the Controller are always able to gain a general survey of the state of accounts; he has to proceed in a similar manner with all the amounts of the budget for which the Controller is responsible. For that purpose he submits week by week a general view of all the sums spent on the several ships in progress of building, and on other works carried on in the yards. His staff consists of 3 superior officials and 13 writers &c.

We find, then, combined under the Controller in the technical department, everything that refers to the floating material of the fleet; to building ships and keeping them in order; to their repairs, armament, and total outfit; and to their equipment and maintenance whilst in commission both in home and in foreign waters. This department guides and superintends all the operations, and all the several staffs employed are subject to it; its financial independence is secured by the fact that, subject of course to the approval of the Admiralty Board, it prepares its own estimates and administers the moneys voted to it; its accounts are subsequently audited by the treasury. Here we find then a *systematic centralised organisation* such as is found nowhere

else in England; it has only come into existence during the last decade, but is now in a position to satisfy all reasonable claims upon it. It no doubt postulates cordial accord among the different heads of departments, and especially among the Directors of the first four sections, but the highly complicated mechanism of the administration of the navy, which might be compared to that of a man-of-war, makes such co-operation indispensable. Still it must be regarded as a defect—not however inherent in the organisation—that the planning of new ships has become the monopoly of the Director of Naval Construction. Albeit that the present holder of the post is a highly gifted expert, still mistakes have been committed; for example, the building of a great number of so called torpedo-gunboats, from the “Curlew” in 1885 to the “Halcyon” in 1894; vessels that were originally intended to be torpedo-boat destroyers, but turned out unsuitable; the inconvenient limitation of space and weight for the machinery of the cruisers of the “Bellona” type and others, and the building of battle-ships of the “Royal Sovereign” type without bilge keels. But on the one hand the English navy, with the means at its disposal, can speedily make good deficiencies and find compensation for defects, and on the other hand the above-mentioned official can utilize the experience gained during a long series of years both by himself and by the whole navy. At any rate, it remains a defect in the organisation, that work of such supreme importance is entrusted to a single pair of eyes.

We have now to mention the two sections placed under the superintendence of the Sixth Lord of the Admiralty, the Civil Lord, who is a Member of Parliament:

6. The DEPARTMENT OF THE DIRECTOR OF WORKS, whose Director is an officer of Engineers in the Army, at present, a major. He executes all the architectural works on land and by the seashore pertaining to the Admiralty both at home and in the colonies, except the buildings in London, and provides for their maintenance and repairs when built; these include breakwaters, harbour-walls, dry-docks, workshops in the yards, magazines, hospitals, fortifications, dwellings of the coast-guards &c., in Chatham, Gibraltar, Hong-Kong, or anywhere else. Contrary to the rule observed in every other department he, being an expert himself, purchases the needful material, and with respect to the acquisition of the ground he makes proposals to the Board of Admiralty. He puts himself in communication with all the departments and their respective chiefs to whose

several domains these structures belong, so as to elicit all the views entertained, and the objections that may be raised. He prepares the estimates for his department to be approved of by the Controller, and independently superintends the expenditure of the moneys voted to him.

The procedure as to the erection of these structures is somewhat as follows: If, for example, a drydock has to be built in a port abroad, the Director of the Works Department has to obtain instructions as regards the dimensions and other details from the Controller, who afterwards will have charge of that dock. The sketch is next made in this department according to instructions and approved of by the Controller and other officials concerned in it; this approval obtained, preliminary plans are designed and forwarded to the station in question, where the officers and officials examine the plans and make report thereon to the Admiralty. These being once more approved of by the Controller, the Director of the Works Department orders the final plans to be designed. In all larger undertakings the actual construction is entrusted to one of the contractors, whose name appears on the restricted list kept at the Admiralty, exactly as is the case with the building of new ships. These contracts are as a rule not offered for public competition, but the registered firms are privately invited to send in their tenders, and well-considered measures of precaution are taken to prevent abuses. Smaller undertakings are usually offered for public competition.

The staff of this section consists of an official, who acts as Assistant to the Director, 11 senior, and 24 junior officials and writers.

7. GREENWICH HOSPITAL, which under its Director forms a small section of the Admiralty. Since 1869 this institution has ceased to be a real hospital or asylum for old sailors of the navy. Details about it will be given under the head "*Personnel*."

The duties of the Director, who has two senior and three junior officials under him, are to administer the revenues of the hospital derived from real property &c. and to manage the school, which has been recently enlarged, and where 1100 boys are educated; he also has to deal with the applications for pensions made by widows of sailors who have been drowned or have otherwise lost their lives in the service of their country, and so on. The picture gallery in the "Painted Hall" of the whilom palace, the Hall of Glory of the English Navy, is entrusted to his charge.

There remain to be mentioned the two departments under the Parliamentary Financial Secretary; these are:

1. That of the ACCOUNTANT GENERAL OF THE NAVY, whose post was created in 1832, at the great reform of the Admiralty. Since then his duties have been subjected to numerous changes, mainly because the examination and eventual cutting down of the estimates of the other departments, and the scrutiny of the accounts of the stores of the technical sections, were the cause of much friction; of the latter he was entirely relieved, and with respect to the estimates his powers over the other departments were correspondingly enlarged.

At present the Accountant General of the Navy is the representative and assistant of the Financial Secretary; His duties are:—1. To examine the sectional votes sent in to him by the responsible Directors of Departments, and to prepare the whole estimates in accordance with these. 2. To remit to the various departments the moneys voted to them in accordance with the estimates, and to watch over the expenditure, the items of which must be communicated to him. 3. If moneys are transferred from one estimate to another, or if estimates are exceeded, to consult the Financial Secretary and in some cases to decide himself. 4. To cause payment to be made on account of all salaries, wages, and other liabilities of the navy.

As a rule he is counsellor of his chief in all questions referring to the expenses of the navy, and all the departments of the Admiralty have to apply to him on questions of finance.

The sphere of this department is consequently very extensive, and the work is divided amongst three subsections; for matters of the estimates, for the payment of salaries and wages and allowances for travelling and daily expenses, for material delivered and work done, &c.; each of which subsections is further subdivided into smaller offices. The *personnel* of this department is therefore very numerous; it comprises besides the Deputy, two Assistants, and a private Secretary of the Head of the Department, 40 senior, and 198 junior Officials.

2. The CONTRACT AND PURCHASE DEPARTMENT under the Director of Navy-Contracts. Up to 1868/69 the heads of the different departments had to procure the needful supplies of victuals, clothing, materials, &c. for the docks, as well as the necessary drugs, medicines, &c. and to make the required contracts; since then these duties have been transferred to the above department especially organised for that purpose. During its existence frequent consultations have been held with

respect to the extent and limits of its functions, and changes have from time to time been introduced in the modes of procedure; at present the state of things is as follows:—

The Director of the department supplies all the materials for the navy and makes the required contracts, except those for ship materials and machinery, which the technical Department or the Admiralty contract for directly with private firms, and materials for inland and coast structures which belong to the domain of the Director of the Works Department. The procedure to be followed by the Director of the department is prescribed for him with the utmost minuteness. As soon as a department has sent him a requisition, he comes to an understanding with the Director in question on all the points of detail; and also with the Lord in charge of that department, to whom he is in that matter to some extent subordinate, and finally he discusses the subject with his Chief, the Financial Secretary, and thus secures as far as possible the harmonious co-operation of all the parties concerned. Purchases are made according to the nature of the material in four different ways: by public unlimited tender, by private restricted tender, by employing a broker, or by direct purchase. About one third of the moneys voted is spent by public tender on stores of a general kind, common articles of trade; one half of the vote is expended by restricted tender, which is generally preferred, so that only one sixth remains for the other two modes of expenditure; brokers are employed in the purchase of common marketable articles of food such as cocoa, sugar, rum, &c. mostly bought in at public auction; direct purchase is made of eminent firms principally of patented articles, and of goods of small value. Supply contracts are generally made for the current financial year, i. e. from the 1st of April to the 31st of March, for certain articles however a three years' contract is concluded.

The firms to be placed on the Admiralty list to be invited to tender for contracts, not open to public competition, are selected with the utmost care, seeing the great importance of this matter. A firm desirous to gain that position must make application for it; investigation is then made by the Directors of the sections concerned as to its technical or financial capacity, and they make report to the Financial Secretary, who has to decide on the admission or exclusion of the firm. The contract in limited competition is not necessarily given to the lowest tender, if it is expected that another firm will render better service. The inspection of the goods delivered is not made by the Contract and Purchase Department itself, as its staff does not include

experts, but by the parties who are to receive the goods, and they have to report on the quality of the articles supplied.

Finally, the Director of the Contract and Purchase Department has to arrange for the sale of old ships that have become useless, and of old stores of all kinds, and has to make a detailed report to the department concerned. His staff consists of one Assistant, 6 senior, and 17 junior officials.

This CONDENSED DESCRIPTION OF THE ORGANISATION OF THE ADMIRALTY exhibits the enormous extent of its sphere of action, and the great variety of its transactions; this is also evident from the number of officers and officials employed. Besides the Lords of the Admiralty, the Permanent Secretary, and the Financial Secretary, the Admiralty employs 40 officers, of whom about one third belong to the Marines and to the Army, 18 Engineers, 3 Medical Officers, one Chaplain, 6 Warrant Officers, 235 senior, and 550 junior officials; altogether in round numbers, some 860 persons. The offices of the Lords of the Admiralty, of the Central Section, of the technical department, and of most of the other sections are on the site of the old Royal Palace of Whitehall in London, some however are placed elsewhere in other buildings; the two offices under the financial secretary, those for the marines, for inland and coast structures, for the medical and clerical sections are very near to Whitehall and those for structures on land in London and for the Nautical Almanack somewhat further off.

The government and administration of this great arm, on which the safety of the country primarily depends, is entrusted, not to an eminent expert, but to a commission, albeit under the presidency of a single Minister who is alone responsible, and consequently authorized to act according to his own discretion. But as he is NOT an expert and is therefore in all things dependent on his military colleagues and advisers, the government is to all intents and purposes a government by Commission; all this is so contrary to our own notions,¹ that we find it hard to imagine how such a contrivance can work; but it is adapted to English circumstances, and as the organisation received a manageable shape by the great reform in 1832 and was, moreover, further improved after the Crimean war, and in many important essentials has been systematised still more during the last decade, it yields results, which are on the whole satisfactory. It being wisely perceived,

¹ i. e. the notions of Germans. The translator.

that the navy is an instrument of policy even in times of peace, the retention of both the chief command and the administration in one single central authority has been firmly adhered to; on the other hand it is considered incompatible with the balance of power within the Constitution to entrust so mighty an engine as the great navy to the hands of a single officer in the capacity of a Lord High Admiral. The House of Commons therefore, anxiously watching over the fundamental principles of the Constitution, decides that the post should be held by one of their own members, who, being neither an expert nor a military man, is unable to gain a preponderant influence.

However the First Lord of the Admiralty is entrusted with such far-reaching powers, that he is not bound even by an unanimous vote of all his colleagues and may on his own motion alter the whole distribution of duties above described; consequently he can, in case of need, give immediate effect to the decisions of the Cabinet concerning the employment of the fleet or any other measures without giving notice thereof to his colleagues, even if it involves considerable expense. The Financial Secretary, who has charge of the moneys is no German Councillor restrained by legal prescription within rigid bonds, but a parliamentary politician, who is placed in the midst of the party life of the country and feels himself fully safeguarded by the Cabinet of his own party.

It is a fundamental difference between German and English organisations that there is not a single official in the English Admiralty, who has received a legal education; that there exists no such thing as a hierarchy of officials; and a Privy-Council in our (i. e. German) sense is wholly wanting.

Cases of sudden and urgent necessity are exceptional; the usually harmonious conduct of affairs of importance at the board-meetings, which are held several times a week, secures the mature consideration of all points, is a safe-guard against one-sided resolves, and keeps the Lords of the Admiralty well informed on the course of events; a state of things which is of the utmost value in the working of so extensive and complex a mechanism, and renders unavoidable cases of friction as harmless as possible. Differences of opinion, that make themselves felt at the board of the Lords of the Admiralty, are hardly ever made public; and this all the more as every event that reaches the public is minutely discussed and pitilessly criticized in the press and eventually also in the House. There exists consequently a cordial co-operation between the First Lord and the counsellors chosen by

himself on entering office. Neither are the inspections of the squadrons, dockyards, training-ships &c., undertaken by the Lords of the Admiralty singly, but always by several jointly, and those of the dockyards twice a year.

Quite free from defects the organisation of the Admiralty is not. One defect, the monopoly of designing the plans for new ships except torpedo-vessels and boats has already been mentioned above; cause is given for friction in the regulation that the Director of Dockyards is to arrange for and carry through the building of the ships, whilst the Director of Naval Construction is to see to it that the execution of the work is in accordance with his designs and that therefore both these officials are responsible; similarly with respect to the Ordnance the responsibility is divided between the War Office and the Admiralty. The Accountant General of the Navy fills too responsible a post in that he must approve of every item of expenditure, ere it can be submitted to the Admiralty and that the transfer of votes only needs his own approval; his power is therefore far-reaching on all matters of expenditure, especially on the technical sections. The selection of commercial firms also for admission to the list of houses to be invited to make tenders not open to the public has led to favouritism and friction — in fact, very much depends on the kind of men that hold responsible posts; but this will always be the case even with the best of regulations.

On the whole the present organisation of the Admiralty works well; for example in carrying out the ship-building plans in accordance with the Naval Defence Act of 1889, it has done wonders. True it has so far only been tested in times of peace; the fiery ordeal of a great war it has not yet passed through.

In conclusion we have yet to mention the JOINT NAVAL AND MILITARY COMMITTEE ON DEFENCE, at which the Navy is represented by the Senior Naval Lord, the Admiral Superintendent of Naval Reserves, the Director of Naval Ordnance, the Director of the Naval Intelligence Department, and the Army by the Adjutant General of the Forces, the Inspectors General of Ordnance and Fortifications, &c. and the Director of the Army Intelligence Department; there are two secretaries, an engineer and a naval officer. It is characteristic of the position of officers in England that the chairman is the Under-Secretary of State for War, a Member of Parliament, who is not a soldier. This body was only created in 1890, and is intended to effect the *Co-operation of Navy and Army* nominally only for defence; but as, according to

English notions, the domain to be defended begins at the enemy's coast, offensive operations are not excluded.

An especially important duty of the Admiralty, in the discharge of which all the Lords, the Financial Secretary and all the Heads of Departments take part, is the preparation of the ESTIMATES. Its basis is the programme of ship-building for the year and the increase of military force caused thereby, and this is determined in its turn by the maritime policy of the government of the day. The motion for the building of new ships is usually made by the Senior Naval Lord, on the basis of the information obtained from the Naval Intelligence Department about the preparations made by foreign fleets. After discussion with the Controller the proposals are drawn up, communicated to the other Lords, and then submitted to the First Lord of the Admiralty and discussed at the Board-Meeting. Next the First Lord submits the programme, modified by the Board or not, as the case may be, to the Cabinet, which considers the financial aspect of the question and determines the ship-building programme for the coming year. If the First Lord or the Cabinet decline the scheme proposed by the Naval Lords, or any essential part of it, and if the Naval Lords believe themselves unable to bear the responsibility, there is nothing left them but to resign.

Next the technical and other departments concerned formulate their claims on the Naval Budget; these are examined by the Lords superintendents and submitted to the Admiralty-Board. At the meetings where these matters are discussed, the Accountant General of the Navy is present to argue the financial points, and the several Heads of Departments make the required explanations. Thus the Naval Estimates are at last settled and it is then treated as if already voted by Parliament and steps are taken to carry out the programme, because the Ministry disposes over a workable majority in the house and a refusal or even a curtailment of the Budget is not to be anticipated. This is an undoubted advantage conferred by the English Constitution.

The Estimates comprise two divisions; the principal provides for the effective services, and the smaller for the non-effective services, such as half-pay, pensions and the like. The former includes 12 sections: 1. Salaries and wages for the fleet and coast-guards; 2. Victualling and clothing; 3. Medical Service; 4. Law; 5. Education; 6. Scientific Service; 7. Naval Reserves; 8. Building, repairs and maintenance of ships; 9. Armament of ships; 10. Architectural struc-

tures on shore and inland; 11. Miscellaneous; 12. Admiralty. Next come three sections of the smaller division: 13. Half-pay and pensions for Officers &c.; 14. Pensions and gratuities for men employd in the navy; 15. Pensions and gratuities for officials. In the Budget for 1896/97, there appears an additional item; 16. Annual contribution towards the maintenance of the Australian Squadron. The amounts will be enumerated at a later stage.

III. NAVAL POLICY.

On the NAVAL POLICY of the Government depends the strength and composition, as well as the distribution and employment of the navy; its objects have been changed from time to time and are not even yet finally determined, being exposed to alterations with every change of ministry.

Up to the times of Cromwell England was content with the protection of her own coasts and with securing predominance in the home waters, and even this was only partially secured during the reign of the early Tudors, and wholly so under Elizabeth; this reign marks the commencement of the first OFFENSIVE operations in distant regions. Under the first two Stuarts the navy fell into such rapid decay, that not even the Channel and the English coasts were safe from enemies. The great Protector at once adopted the only true maritime policy for England by employing his reorganised and rapidly strengthened fleet in OFFENSIVE operations, placing at its head Blake, the most efficient of all his officers. This Commander swept the Home-Waters of enemies and pirates, kept them safe by a powerful and active police at sea, by capturing Dunquerque, the principal nest of privateers, and by proceeding with vigour against any and all who did not pay respect to the English flag, and were hostile to English trade. Cromwell engaged in war against his superiors at sea, the Netherlands, and carried it through victoriously. Finally he laid the foundation of England's modern World-Empire by the conquest of Jamaica and by encouraging the English settlements already existing in different parts of the world.

Thus was pointed out to England the way from which it did not

in general depart, although it often fell far short of the Protector's energy and comprehensive view. But as has already been stated in the historical introduction, the elder Pitt with Anson and Hawke, and the younger Pitt with Jervis and Nelson, energetically followed the track laid down by Cromwell with such energy and persistence, that it has since the beginning of the current century been regarded as the guiding principle of English Maritime Policy. In 1815 the English Fleet was the sole mistress of all the seas, maritime trade had become almost a monopoly of England, and there existed no obstacle to the unlimited extension of her great Colonial Empire.

Now followed a long period of peace giving birth to humanitarian and free trade principles and pushing Pitt's policy to the back-ground; the mercantile and war-navies of other nations regained their strength and asserted themselves. After 1838 England was from time to time alarmed by "scares" at the French Naval Power; but as no great naval war arose and as the English naval officers exercised but slight influence on the country, partly because its institutions are unfavourable to them, and partly because of their own lack of mental activity, the undesirable state of things continued till the beginning of the eighties, when a new era opened; attention was drawn to the imminent dangers of a great war, the aspect of affairs being fundamentally changed by the introduction of steam, ironclads &c., and definite plans were formed for the retention of England's predominance at sea.

Individual officers like Admiral Colomb, General Chesney, Lord Charles Beresford and others, far surpassing their contemporaries in military science, largely contributed to bring about this improved state of affairs.

Then commenced the numerous effective changes and new creations in the organisation of the Admiralty, beginning with the appointment of the Naval Intelligence Department in 1882 mentioned above under section II; this soon led to the great annual manœuvres of the fleet, to the first experiments in mobilisation, to the thorough reform of the work in the dockyards, in a word to a total re-organisation of all the preparations for war. In the Imperial Defence Act of 1888 £2,600,000 were voted for the protection of Naval Ports and Coaling-stations at home and abroad, and £850,000 for building a squadron of cruisers for Australia. Next the New Conservative Ministry, having resumed the wise Naval Policy following upon the Naval Defence Act of May 1883, came forward with its great programme for ship-building, which wisely took into account the new necessities that had arisen. It was

proposed to build within a period of 5 years 70 vessels, of which 10 should be battle-ships and 42 cruisers. It is to be specially pointed out that contrary to the ancient parliamentary usage of centuries, the *whole* sum of nearly £22,000,000 was voted in advance and not merely the partial amount that appeared in the budget of 1889/90. Thus opened the new epoch in England's maritime policy, which is based on the strategy for a great naval war adapted to the circumstances of the present day.

The DUTIES OF THE FLEET are essentially identical with those it had to discharge at the beginning of the century; viz:

a. Duties of Defence.

1. To keep the United Kingdom safe from invasion and its coasts from insult and injury;
2. To protect the commercial navy in all seas, likewise the fisheries;
3. To keep the sea open for the arrival of imports into the United Kingdom;
4. To protect India and all the colonies;
5. To keep open the communications between the mother-country and her colonies and India.

b. Offensive Action, in connection with the above.

1. To keep the enemy's fleets locked up in their harbours, and to defeat, and if possible to destroy them, if they venture out;
2. To blockade the enemy's ports and do injury to his coasts;
3. To pursue and destroy the enemy's cruisers and privateers;
4. To capture or destroy the enemy's commercial navy and fishing fleets;
5. To compel the trans-oceanic possessions of the enemy to surrender either by cutting off all their communications, or by actual forcible capture by the army.

The successful carrying out of these offensive operations would at the same time secure mutual unhindered communication between Great Britain, her colonies and India; this free communication being the indispensable condition of their retention.

Since the beginning of the century circumstances have undergone changes both great and essential. Then Great Britain had 10½ million inhabitants, her industry was but slightly developed, the soil was

fully cultivated and remained so right to the middle of the century, so that the country maintained itself and was independent of foreign supplies, and industry being but slightly developed did not call for any large importation of raw material. But now the population of the United Kingdom has risen to nearly 40 millions, the area under cultivation had even ten years ago been reduced to one third of what it had been before, so that the yield, although proportionally very high, still suffices for barely one fifth of the population. This is accompanied by a heavy fall in the price of provisions; between 1872 and 1895 the price of wheat fell 60%, of barley 41%, of oats 48%, of beef between 1877 and 1895 about 31%, of mutton about 20% and so on; at the same time the general mode of life and consequent consumption of provisions has considerably advanced; it does not pay to grow cereals; the soil, whose area might suffice for the support of the whole people, is returning ever more to pasture. Moreover Industry has expanded so largely, that it gives direct employment to five million workmen, not inclusive of those depending on them; were the importation of raw material interrupted, two thirds of these men would be out of work and out of bread.

The maritime trade of Great Britain has increased enormously. In 1785 the imports and exports amounted to a little over 31 million pounds; in 1894 it had risen, according to official statistics, to upward of 947½ million sterling; that is, it had multiplied thirty fold. And this is not inclusive of the trade in precious metals between the mother-country and the colonies, nor of the value of the vessels &c.; if these were added, it is calculated that the amount would rise to 1650 million sterling, being 53 times the amount of 1785! There has been an especially rapid increase in the importation of food stuffs during the last decades; for example in the 25 years intervening between 1865/69 and 1890/94 the importation of wheat had risen from 2,980,000 tons to 6,550,000 tons or by about 120%; Indian Corn from 1,180,000 tons to 3,480,000 tons or by 194%; bacon from 60,000 tons to 300,000 tons or by about 500%. And in spite of the fall in prices, the total value of the imported food stuffs has risen enormously from £64,700,000 in the year 1871 to £174,250,000 in 1892, that is to say nearly 200 per cent in 21 years.

The British mercantile navy has also advanced with gigantic strides; in 1894 it consisted in round numbers of 36,000 vessels (of more than 100 tons) amounting altogether to some 12,779,000 tons. Of these, 21,000 vessels belonged to the United Kingdom and their

tonnage amounted to nearly 9,000,000 tons, employing crews numbering 240,000 men. The number of fishing boats is said to exceed 27,000. The unchecked importation of food-stuffs for the support of the population, and of raw materials to feed the factories, has become incomparably more important than it was only 30 years ago; in fact the very existence of the state depends on it. And this all the more, because the usage of trade has changed, ever since communication with the exporting countries has been made so safe and rapid by telegraphs and steamers as to obviate the necessity of adhering to the old practice of accumulating large stores for months before the demand was expected to arise; now people live from hand to mouth. This state of things has no parallel in history; there is a certain resemblance to ancient Rome at and after Sulla's time down to the time of the Emperors, when the cultivation of cereals had been almost wholly abandoned in Italy and the supply of corn from Sicily was a life and death question to the Eternal City.

Moreover the enormous increase of the mercantile navy and its distribution over all seas has largely increased the difficulty of protecting it against the cruisers and privateers possessed of the modern appliances for rapid navigation.

The question, how the English navy will in these altered circumstances be able in a great war to satisfy the claims upon it, has been much discussed, but by no means answered, no experience being available. Certain fundamental maxims are however universally admitted; first and foremost the principle that the strength of the English Navy must far exceed that of any other. The only criterion for comparison as yet known is simply to count the number of ships of the several classes; battle-ships, coast defence, iron clad, armoured and unarmoured cruisers and torpedo boats; a scientific method of estimating the different kinds of ships according to age, size, armour, armament &c. has not yet been discovered. About the amount of the required superiority, people in England are not yet agreed; those who go farthest demand that the English navy alone should equal that of all the rest put together, but it may be regarded as an accepted principle that in battle-ships the English fleet must to some extent surpass the two fleets next in size combined, viz: the French and the Russian; the number of cruisers must be adapted to both requirements, viz: that of accompanying battle-ships and protecting English commerce on all the seas.

As for the EMPLOYMENT OF THE NAVY IN WAR a great deal is said

about defensive warfare, the fleet is always called the "FIRST LINE OF DEFENCE," and the several enactments for the magnificent increase of the navy are officially designated as "THE NAVAL DEFENCE ACTS," but in reality it is regarded as self evident that the English domain begins at the *Enemy's coast* and that the sea is ruled over by the British trident. It follows, that a thoroughly OFFENSIVE strategy is as far as possible kept in view on principle, as has been explained above, sub-section b. 1—5.

The blockading fleets outside the enemy's ports are to surpass those shut in in the proportion of 5 to 3, so that, if some ships are temporarily disabled or absent to bring a supply of coals &c., the ships remaining should still be a match for the enemy, and the battle-ships are to be accompanied by a great number of cruisers for out-post service, scouting, keeping up communications and the like; also by a number of torpedo-boat destroyers to act against the torpedo-boats of the enemy. Cruisers of greater or less strength would uninterruptedly watch over those parts of the enemy's coasts near which commercial highways pass; also over narrow straits (Gibraltar, Babelmandeb, Bass' Straits), and would patrol the much frequented maritime highways to protect their own merchantmen and capture those of the enemy as well as his cruisers, auxiliary cruisers, and privateers. By this means communication would also be kept open between the mother country and her squadrons, coaling-stations and colonies, while her maritime trade and the important transport of coals would be safe-guarded. Whether large transport or commercial fleets, especially slow sailers like the usual freight steamers should not be convoyed across the ocean, as was the practice in sailing days, is still an open question, which will probably be answered affirmatively in the next large maritime war. The fishing fleets will certainly have to be so protected. Squadrons abroad will be re-inforced, in order effectively to secure predominance at sea, protect maritime trade and capture the enemy's colonies.

The maintenance of British Supremacy in the Mediterranean, which has risen in importance since the opening of the Suez Canal, forms a separate problem; it is concerned with large commercial interests (in 1895, no less than 60% of the British corn-supply passed through the Dardanelles) and still more with the communication with India, whither great masses of troops would have to be despatched immediately after the outbreak of war, to ward off a land attack by Russia. Some years ago opinions on this point were divided, but now there

is no doubt, that the squadron in the Mediterranean, which has lately been re-inforced and in time of war will receive still further additions will, supported by Gibraltar, Malta and Alexandria-Port Said endeavour to retain the mastery of the Mediterranean.

Whether, in view of these numerous tasks the English navy will be able to prevent interruptions of the import-trade of the country, especially if war were to break out suddenly and the enemy were to make skilful use of well-appointed cruisers, experience alone can teach us. Even a short temporary interruption causing dearth of the raw material for manufactures might throw great numbers of men out of work—as was the case with the cotton-supply in the War of Secession—and, with an enhanced cost of provisions, create distress to the working-classes bringing trouble and riot in its train.¹

A less grave, but still in the long run very grievous injury to shipowners and merchants would be the great rise in the premium of insurance for English ships and cargoes. Considering the colossal value of the merchandise afloat a rise of a mere small percentage would represent many millions, and yet this payment would not be the chief harm; the danger is that the rise of insurance would transfer the British carrying trade to neutral flags. Less than ten years ago the then Financial Secretary of the Admiralty publicly declared his conviction that in a great maritime war the whole British commercial navy would pass over into the possession of neutrals and sail under neutral flags. This certainly is very improbable for this reason, that the validity of sales concluded after war had been declared, would not be admitted by the enemy and thus the vessels in question would be treated as British ships and be either captured or destroyed, provided always that there is no STRONG PROTECTING FLEET at hand; but in consequence of the high war-premiums and the obvious dangers British ships would not be entrusted with cargoes and would lie idle in port, so that the British commercial flag would rarely be seen on the ocean. The grievous loss accruing therefrom to merchants and shipowners in Great Britain would continue for a long time even after the termination of the war, as trade does not readily return to channels which it has been forced to forsake. "Commerce is a delicate structure" justly says the German Poetess, and it would thus not be

¹ This apprehension of our author seems groundless in view of the exemplary conduct of the Lancashire workmen during the very cotton-famine he alludes to.

The translator.

easy to overestimate the material injury suffered by England from this cause. This is a point on which influential circles in England are very sensitive, and a temporary interruption of imports may exercise a decisive effect on the direction of English policy.

Such a state of affairs fully justifies the maritime policy of England so to increase the navy, that it should be able to maintain its predominance in all seas and under all circumstances, even in the face of the largest coalition. Battleships are therefore regarded as the kernel of naval power; these must be built of such a size, that every tactical unit should be superior to that of the enemy. Similarly the cruisers should be double the size of the largest now existing; they should be very swift and able to keep the sea for a long time, so as to protect the commercial highways and destroy the enemy's cruisers. And finally the torpedo-boat destroyers, taking the place of the torpedo-boats used by other nations, should by superior counter-attacks deprive these latter of all chance of success. The manning of the navy also has of late been largely increased from year to year; during the last seven years by 28,345 men, numbering now (1898) 106,390 men, and these can in case of need be immediately increased by calling in the whole body of coast-guards and the accessible portions of the naval reserves, thereby enabling the Admiralty to mobilize upwards of 120,000 men, including officers, subordinate officers &c.

This rapid increase of men even on a peace footing enables the navy to appear in all seas even during *peace* with a force superior to that of every other nation; and to enable the British squadrons to maintain their predominance in war also and to keep the sea, provision is made for adequate organisations and equipments of suitable Naval Ports as bases of operations and of coaling stations along the principal highways. The fortification of these points, and other provisions against hostile attacks, left a great deal to be desired, but eight years ago only with the sums voted for that purpose by the Imperial Defence Act all needful measures have been taken to meet any conceivable hostile forces that may appear unexpectedly; ports also are being built and special attention is devoted to increase the number of DRY DOCKS, suitable to the mighty battle-ships and cruisers of modern days.

Under such circumstances the navy finds it an easy task to discharge its duties in TIMES OF PEACE, protecting English merchantmen, subjects, and interests both at sea and in foreign ports; rendering assistance in case of need, and doing police duty at sea against pirates and

slavers which still appear here and there; but above all universally asserting English predominance on the waves. Thus the navy becomes, even in times of peace, a very effective instrument of English policy and makes possible the uninterrupted further expansion of the huge Empire, which even now occupies an area 54 times that of the German Empire with a population seven times as numerous.

The successes of the Navy are not restricted to mere small expeditions against savage or semi-savage tribes, but even civilized states that are *weak at sea* have been forced to make concession by the mere threatening presence of an overwhelming squadron without the necessity of firing a single shot, as for example in 1890 when Portugal was compelled to cede extensive tracts of land in South Africa. If the application of force appears unavoidable, the fleet either acts independently as it lately did in Zanzibar, or lands troops, supplies them with food and other necessities and either serves them as base of operations or arranges one for them either afloat or on shore; frequently the troops are supported by naval brigades, as for example in the Indian Mutiny, where they took a glorious part in the storming of Lucknow. Occasionally they even make independent expeditions into the interior, as a few years ago at Witu in East Africa.

Thus both in war and in peace it is the NAVY to which England is indebted for her grandeur, universal power, and prosperity.

IV. STATIONS, DOCKYARDS, &C.

Immediately under the Admiralty there are placed 15 independent naval commanders, 10 of whom bear the title of Commander-in-Chief, and 5 hold positions of less importance. Seven of the first are heads of the 7 LARGE FOREIGN STATIONS OF THE NAVY, the other three—Admirals or Vice-Admirals—are Port Admirals IN THE THREE HOME STATIONS, whose chief places are the great Naval Ports, Portsmouth, Devonport and Chatham.¹ The two latter stations, however, do not bear the names of the actual Naval Ports, but one is called "Plymouth" after the commercial port of that name, whose outer

¹ See the plans of Portsmouth, Plymouth and Chatham.

harbour Plymouth Sound, is protected by a mighty breakwater, whilst Devonport¹ close by is situated on the "Hamoaze", the deep estuary of the small river Tamar, which forms the fully protected inner harbour; the other is called the "Nore" from the Nore Lightship marking a shallow off Sheerness.

a. Home-Stations.

The range of these three stations embraces all the coast of Great Britain; that of the Nore the east coast of England and the whole coast of Scotland; that of Portsmouth extends from Dover in the east, as far as Tor Bay near Start Point in the west, and includes also the Channel Isles; that of Plymouth from Tor Bay round Land's End as far as the borders of Scotland, inclusive of the Scilly Isles. The supreme command exercised by the Port-Admirals over the coasts is more nominal than real; neither the lighthouses nor the coast-guard stations are subject to them, nor do they inspect these, any more than the ships in commission belonging to the coast-guards, that are permanently stationed in their several harbours. Barring some occasional trips to the Scilly or Channel Islands they hardly ever leave their ports, where their powers are very extensive.

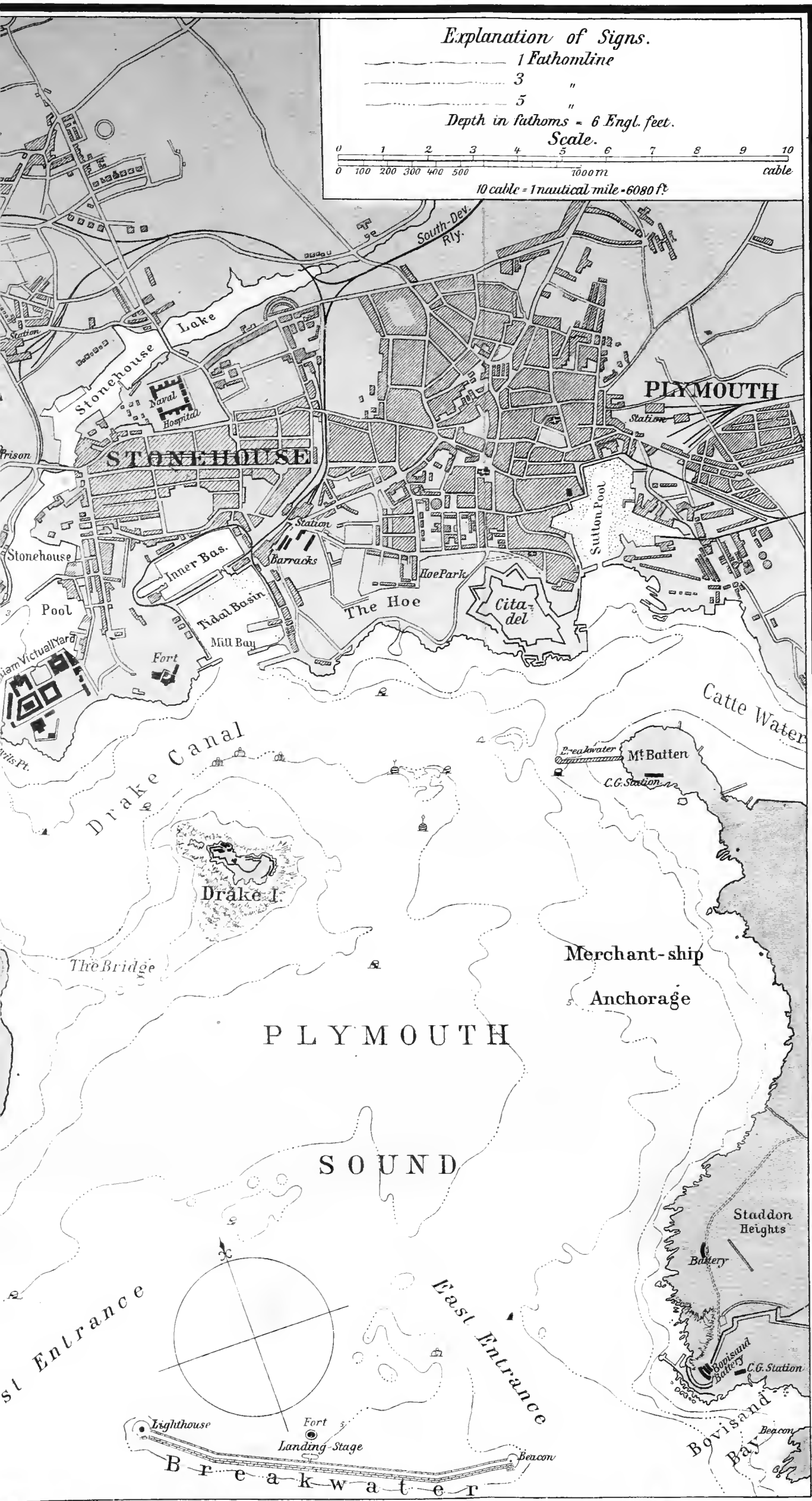
The three Commanders-in-Chief live in their respective naval ports in their official residences on shore, but they and their staffs and a number of other officers &c. are borne on the lists as living on board their flagships, although these afford very inadequate, or perhaps no accommodation at all; in Devonport and Chatham² two small despatch-boats of 550 and 453 tons respectively do duty as flag-ships, and in Portsmouth the flag-ship of Jervis at St. Vincent and of Nelson at Trafalgar, the famous "Victory", from due loyalty and reverence, is still the flag-ship of the port. The enumeration in the ship's books of men not actually living on board, whereby they retain their ships' allowances, is an old practice from the times, when every one engaged in effective service of the fleet, except a portion of the marines, had to be on board and was considered as discharged or reduced to halfpay on quitting the ship. Naval men on active service ashore were not known in those days. Not very long ago, a strong reserve of

¹ This name is comparatively modern, it was formerly "Plymouth Dock," hence the still existing predominance of the name Plymouth, though the child threatens to outgrow the parent. The translator.

² Nominally only; the port guardships actually fly the flags. The translator.



Harbour of Plymouth and Dockyard of Devonport.



Plymouth and Dockyard of Devonport.

men was kept on board the harbour ships to meet any sudden contingency; only lately barracks have been erected in the naval ports on account of the great numbers to be accommodated and from sanitary considerations.

The Commander-in-Chief is in charge of all the men-of-war in Commission that are in the harbour, even of those that form part of a squadron and of the flagship, if the Commander of the Squadron is a Junior Admiral. If a Senior Admiral arrives outside the port he requires the consent of the Commander-in-Chief ere he is allowed to send one of his ships into the harbour; if his flagship has to enter the port he must haul down his flag and hoist it on another ship of his squadron that remains outside. Within the harbour the Commander-in-Chief is the Chief Officer and sole Commander; on the other hand he has no power over ships that are out of sight from his flagship, unless they are expressly put under his command.

Of the ships in port that are laid up in ordinary the so-called fleet-reserve is subordinated to him directly; this reserve was instituted 8 years ago as a more speedy preparation for war. Previously all the ships laid up in ordinary belonged to the yard and were divided into four classes according to their state of preparedness. The first of these classes of ships ready to be put in commission, consisting of the First Class Steam-Reserve, was placed under the command of a naval captain, who had under him a number of men, sufficient to keep ship and machinery in a proper state of repair and he was responsible for it; but partly because he never had his full complement, and partly because the men he had were employed elsewhere in the yard, the arrangement did not work. This portion of the reserve, since called the fleet-reserve, has been withdrawn from the command of the dockyard-authorities and put under an executive commander.

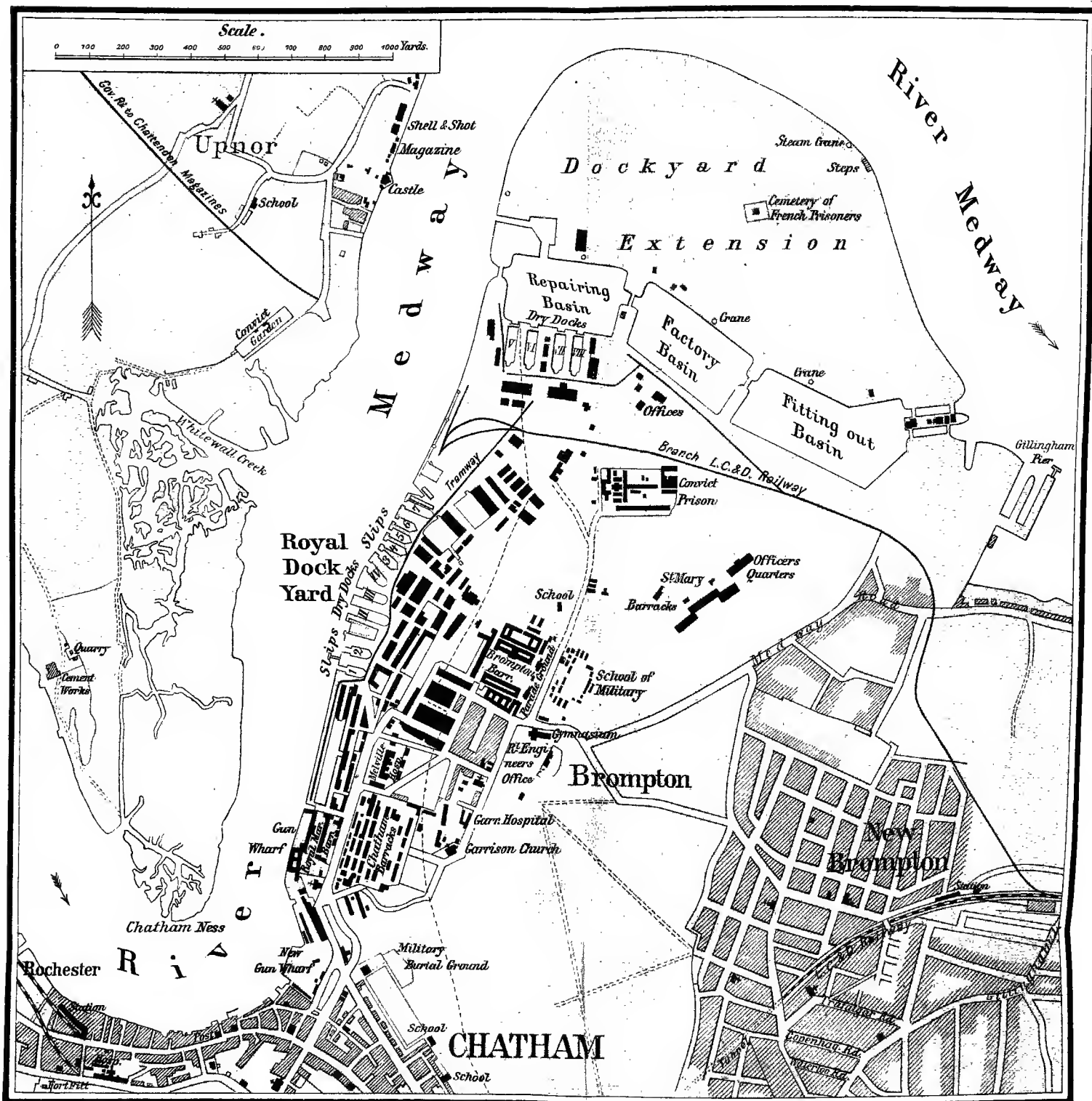
Since that time the ships in the Reserve have been grouped into 5 divisions, numbered A—E, of which A and B form the fleet-reserve, the other three corresponding to the former reserve classes 2, 3, and 4—the dockyard-reserve. Division C. comprises the ships that are being fitted out; D. those under repair; and E. the obsolete ships; they are all completely dismantled and in charge of the yard. The ships of the fleet-reserve are manned with crews numbering one-third of their full complement, are fully equipped, with full bunkers; the machinery, steering-compasses, and armament have been thoroughly tested, so that after being fully manned and having taken ammunition on board, which must be done in the roadstead, they would be ready

to go to sea within 24 hours. But as the very complicated mechanism of modern men-of-war frequently necessitates small repairs, the fleet-reserve is classed into two divisions, A. comprising those ships and torpedo-boats which are ready for immediate despatch, and B. those which, though under repairs, can still, in case of need, be readily employed.

The PERSONNEL required to put the ships in commission is like the ships themselves distributed over the three home-stations. Four years ago (1894) it numbered, inclusive of the crews of the ships in Commission, but exclusive of the officers &c. 43,576 men; viz: 26,264 men, i. e. about 60% seamen, 12,721 or 30% engineers, and 4591 or 10% artificers or other labourers employed in the yard. Of this grand total 17,330 men, or about 40% belonged to Portsmouth, 14,226 men or about 32% to Devonport, and 12,020 men, or 28% to Chatham, or more correctly Sheerness, which is the men's depôt. These numbers include the crews of the ships in commission in port, also the crews and other persons of the several divisions of the fleet-reserve, the men in training in the training ships &c., and some extra men for trial trips, detachments of workmen &c. In consequence of the constant increase in the number of the men, the frequent changes of ships—new ones being added, others lost or discarded—these totals are not constant, but are subject to a yearly revision; losses are replaced by the admission of lads who have finished their training, (5000 of whom are being educated), and finally by enlistment, each of the three ports having assigned to it for that purpose a portion of the United Kingdom and of the gigantic Capital, London.

The Port Admiral being Chief of the fleet-reserve and of the whole military force fills a post of special importance in the preparation for war and in the mobilization of the fleet. When ships of the reserve in the docks are being put in commission, or those of the fleet-reserve are got ready for sea, it is his duty to superintend, and if need be, to expedite their outfit, to fill up the crews of all the ships with suitable persons, and to see that the ships ready for service should not remain in harbour longer than is necessary. He orders the alterations and repairs of ships and attends to their prompt execution; if required he increases the number of workmen. He proceeds in the same way when ships are dismantled, and he discharges the men, that have served their time.

The Port Admiral is at the head of the technical and other naval establishments belonging to his port, such as the dockyard, the vic-



Chatham Harbour and Dockyard.

tualling yard, the ordnance depot, hospitals, school ships &c., but he may not interfere in the *working* of those establishments which are managed by a superior officer or official bearing the title of "Superintendent."

In time of war he orders ships to cruise outside the harbour to inform him betimes of the approach of any enemy's ship, and he has to see that no hostile vessel finds ingress into the harbour. Very extensive precautions have of late been taken to meet such a contingency, especially against the entrance of torpedo-boats &c., not only by batteries and electrically lighting up the mouth of the harbour at night, but also by the construction of heavy booms strengthened by insurmountable obstacles.

Notwithstanding the extensive range of powers of the Port Admiral within his sphere, yet he is wholly dependent on the Admiralty, to whom he is to make accurate report about all occurrences; every morning about wind and weather and every evening about any and every event worth recording &c. By this means the Central Authority is kept fully informed in every respect about the state of affairs in the three great naval ports.

Each one of the three home-stations comprises:

- a. A large dockyard, serving principally for repairs and outfit of men-of-war;
- b. a gunwharf;
- c. a victualling yard;
- d. one or more hospitals;
- e. barracks ashore and afloat.

b. Home Dockyards.

The three great HOME DOCKYARDS are in Portsmouth, Devonport, and Chatham, the latter also comprising a smaller yard annexed to it at Sheerness on the Island of Sheppy at the mouth of the Thames. They have to fulfil principally the following purposes:

1. The rapid supply of the ships in commission and of those of the fleet-reserve with the complements of stores, and with the needful repairs and outfits;
2. The speedy fitting for service of the ships of the divisions C. and D. laid up in ordinary in the dockyard-reserves, so as to add them to the fleet-reserve;
3. The keeping in store of all the materials necessary to satisfy

the needs of the ships enumerated under head 1, and the holding in readiness of all the things necessary for the warlike outfit of the dockyard-reserve and the completion of the said outfit with utmost speed, and above all on mobilization of the fleet.

4. The skilful, speedy, and cheap construction of all the new ships and machinery ordered of them.

The organization of English dockyards differs from that of German yards mainly in this, that with the exception of the ram, which is really part of the ship itself, English yards do not manufacture armament; this is the consequence of the peculiar position held in England by the naval ordnance ever since the middle of the last century, as has been pointed out above under section II.

SHIP-BUILDING has from of old been carried out on a large scale in all the three yards; and during the last decade they have also begun to construct ship's engines such as had up to then been manufactured exclusively in private factories. They first began on a small scale, but are now already able to build engines for cruisers of the 2nd. class up to 9600 H.P. This includes also the numerous mechanical contrivances on board, the mountings of guns of all kinds from the largest in armoured turrets down to the small quick firing guns and machine-guns and finally also the torpedo-armament. Previously it was thought that the Royal yards worked slowly and expensively; the numerous and to some extent serious shortcomings in their organization and working (cf. section B.) may have justified this opinion; but of late years the contrary has been proved by actual experience. For example the mighty battle-ship the "Royal Sovereign", of more than 14,000 tons displacement, was built in Portsmouth with remarkable speed; she was finished, stood all the necessary trials satisfactorily, and was *put in commission* as fully prepared for war and added to the Channel Squadron, within *two years and eight months* from the date, when the first keel plate was laid down. The still larger battle-ship the "Magnificent," of 14,900 tons displacement, was constructed at Chatham with such speed that she was floated out of the dry dock exactly in one year and put in commission 20 months after the first keel-plate was laid down, and it is intended to produce the newest battle-ships of equal size in similarly short periods of time. These achievements stand unmatched, and the large private yards, that have been entrusted with the building of sister-ships cannot keep pace with the work of the Royal dockyards. Moreover the cost of production in the Royal yards is somewhat

less than in the private yards. The battleship "Empress of India", of 14,150 tons displacement, built in a Royal yard cost a trifle over £861,000; the "Resolution", also of 14,150 tons displacement, built in a private yard cost nearly £883,120; a difference of upwards of £22,000 in favour of the Royal yard. Cruisers on the other hand are built more cheaply in private yards. In consequence of this the Royal yards are fully employed in building new ships; Portsmouth builds chiefly battle-ships and large cruisers, Devonport cruisers of various dimensions, Chatham vessels of all kinds, Sheerness smaller cruisers and machinery. The *large* ships engines are still supplied by private firms, among whom John Penn & Sons of Greenwich, Maudsley Sons & Field of London; Humphreys, Tennant & Co., of Deptford; Hawthorn, Leslie & Co., of Newcastle; Laird Bros. of Birkenhead; Thomson Bros. of Clydebank; Harland & Wolff of Belfast, deserve to be especially mentioned.

The large home yards are moreover fully supplied with men, materials and machinery for effecting all sorts of repairs; they contain an adequate number of large and small dry docks to execute works and the repairs of damage under water, to clean and paint the ship's bottoms &c. Finally they supply ships with all things required for service on board, for keeping the vessels in good order, for the accommodation of the crews and supplying them with all things needful except arms, victuals and clothing; all the various and exceedingly numerous stores are kept in readiness in large storehouses. Consequently the yards are also of great military importance in the mobilization of the fleet.

In each of the three great dockyards a Rear Admiral under the title of Admiral Superintendent guides and supervises all the work of the yard; according to regulations he holds the post for three years; exceptionally however and for special reasons, by Order in Council, he may be retained six months or a year longer in that post. He hoists his flag on a ship specially and permanently set aside for that purpose—there are three old wooden ships of the line in the three several yards which at the same time serve as guardships for the Dockyard-Reserve.

In addition to the three great dockyards there are in the United Kingdom the following establishments:

1. The considerable building yard at Pembroke in Milford Haven, superintended by a Post Captain, acting in the capacity of Captain Superintendent, which is devoted to building battle-ships and cruisers.

2. The small yard Haulbowline in the harbour of Queenstown near Cork, which stands under a Rear-Admiral acting as "Senior Officer on the Coast of Ireland"; he discharges in a way the functions of Port Admiral for all Ireland and the whole island belongs to his range of command; the operations however are not extensive, Haulbowline being fitted neither for building ships nor for fitting them out, but only for smaller repairs and for the supply of various kinds of stores, principally coals. It is a base of operations for the fleet on the South coast of Ireland.

3. A great depôt of stores in combination with the chief victualling yard at Deptford near London, under a highly placed official acting as "Superintendent" and finally:

4. A coaling station in the harbour of Portland by the Bill of Portland, between Portsmouth and Plymouth which has lately been constructed and protected against torpedo-boats; it now serves as a place of assembly for the fleets in the Channel, somewhat like the open roadstead of St. Helens east of the Isle of Wight in former days.

An estimate can be formed of the EXTENT OF WORK IN THE HOME YARDS from the fact that in the financial year 1896/97 there were 856 officials on the several staffs, whose salaries amounted in round numbers to £160,000. There were employed 6088 permanent workmen and 17,262 day-labourers, making a total of 23,350 men (in round figures 4000 more than in the previous year). The total wages amounted to £1,700,000. The men in constant employment are divided into two classes; a small class of only 146 men who live inside the yard, and a large class of mechanics; the former earn on an average £86.10.0. a year, the latter (5942 in number) average £84.4.0. The men temporarily employed earn £67.0.0. There are employed in the yards 396 policemen, drafted from the London police.

The total expenditure for the financial year 1896/97 amounted for salaries and wages to £2,146,000; for material to £2,296,000 making a grand total of £4,442,000; besides this there were spent 5½ millions for work done in private yards and factories; viz: for vessels £2,395,000, for engines £2,420,000, for gun-carriages £480,000. Of the total vote of £9,950,000 no less than £7,532,500 were spent on the building of new ships; the Royal yards spending in this way a good half of their share of this vote, and the work done by contract consuming nearly the whole of the sum allotted to it. As the total vote for the Navy amounted to £22,260,000, it results that 34% of



"Victory" Dock Yard
Portsmouth Harbour

"Duke of Wellington"

it, more than one third, was devoted to the building of new ships; a very large amount.

c. Portsmouth Dockyard.

It would lead us too far to enter into a detailed description of the organization of all the dockyards; let that of Portsmouth, the largest and most ancient of all, serve as a sample. It dates from the beginning of the 13th century; in 1212 it was enlarged and fortified. The first dry-dock was built in the reign of Henry VII. 1495—1497. It was improved under Henry VIII. and still more under Cromwell. After the Seven Years' War it was greatly enlarged, and in 1848 there were added shops for the repair of machinery, but its present extent it attained only lately by a large addition of capacious new buildings. The Yard now covers an area of about 115 acres; it possesses numerous spacious basins, protected by tidal locks, also 5 slips and no less than 16 dry-docks, besides 2 long locks, which can also be used as docks. The older dry-docks are only 220 to 287 feet long, 53 to $67\frac{1}{2}$ feet wide at the entrance gate, 20 to 26 feet depth of water at the mean high water line over the sill; these dimensions were sufficient for the wooden ships-of-the-line, but are not nearly adequate for the gigantic battle-ships and cruisers of the present day; accordingly some of the new docks attain a length of no less than 500 feet, a breadth of 95 feet and a depth of $41\frac{1}{2}$ feet, so that the largest ships with utmost draught of water find easy admittance; a matter of no slight importance considering that in future combats great injury will probably be done to ships below the water line.

The tabular statement on page 96 enumerates the Heads of Departments of Portsmouth Dockyard as well as their staffs and salaries.

There are according to it 251 persons on the several staffs and among them there are only two naval officers, so that inclusive of the two naval officers in column 1 there are employed only four¹ naval officers in the whole of that extensive yard. All these as well as the other employés of the effective services, engineers, surgeons and some warrant officers are borne on the books as resident on the flag ship of the Admiral Superintendent. It is to be noticed that surgeons and chaplains do not belong to the staff of the station, but to that of the dockyard.

¹ There seems to be here some misapprehension; the Navy List contains at least 12 names with the letters R. N. after them; indeed the latter part of the statement appears to contradict the earlier part.

The translator.

Designation	Rank	Pay	Number of staff
Admiral Superintendent .	Flag Officer	1880 0 0 ¹	8
Master Attendant and Queen's Harbour Master	Staff Captain	600 0 0 ¹	7
Chief Constructor .	{ Engineer of Naval Construction }	677 0 0 ¹	84
Chief Engineer .	Naval Engineer	646 0 0 ¹	25
Naval Storekeeper . . .	Civil Official	650 0 0 ¹	49
Cashier	ditto	675 0 0	21
Officer in charge of Expense accounts. . .	ditto	650 0 0	56
Surgeon	Naval Surgeon	655 0 0 ¹	1
Chaplain.	Naval Chaplain	550 0 0	—

¹ Also official Residence.

251

The number of workmen employed in the yard last year was 6520.

Of the other home-yards we will in the subjoined tabular statements only give the number of men on the STAFFS and of the WORKMEN, with their salaries and wages; also the number of dry-docks which supply sufficient criteria for comparison with Portsmouth dockyard with respect to the extent of the works and their importance.

Name of the Yard	STAFFS		WORKMEN		DRY DOCKS	
	Numbers incl. of Heads of Depart.	Pay	Average Number 1895/96	Wages paid	Total Number	Large ¹
1. Portsmouth	260	£47,819 7 0	6520	£478,965 10 0	18	10
2. Devonport	214	£39,952 8 0	4405	£323,245 3 0	11	4
3. Chatham	188	£34,739 3 0	5040	£370,608 17 0	10	6
4. Sheerness	103	£19,931 16 0	1575	£115,755 14 0	5	—
5. Pembroke	67	£13,633 6 0	1650	£121,219 17 0	1	—
6. Deptford (Victualling Yard).	19	£ 3,607 15 0	133	£ 9,231 0 0	—	—
7. Haulbowline	3	£ 407 0 0	39	£ 2,580 12 0	2	2
8. Portland (Coaling Station)	2	£ 166 5 0	8	£ 805 16 0	—	—
Total	856	£160,257 0 0	19,370	£1,422,412 9 6	47	22

¹ "Large" Docks are those which admit the largest battle-ships and are at least upwards of 300 feet long, 60 feet broad and 24 feet deep over the sill.

As has been stated above the existence of Portsmouth Dockyard is traced back to the beginning of the 13th century. Soon after his accession to the throne Henry VIII. founded the Admiralty and the Navy Board and introduced an organized administration of the Navy; he supported this dockyard and also constructed yards at Woolwich and Deptford, but these have of late years been discontinued. During the reign of Elizabeth, Hawkins rendered great service to the administration of the Navy especially to the dockyards, and the Queen herself founded that of Chatham. Under Charles II. this was enlarged and extended as far as Sheerness, so that in the Anglo-Dutch wars it was regarded as most favourably situated for the conduct of the war, and as the first dockyard of the country. When after the revolution of 1688 Holland, by that time greatly weakened, had become England's ally, and France was the enemy to be conquered, Plymouth dockyard, previous to 1689 a mere floating workshop, was built, being more favourably situated for a war against the west coast of France, and 75 years afterwards, in 1764 this yard was greatly enlarged. Its present name "Devonport" it received in 1824, and the machine-shops at Keyham, like those of Portsmouth, were only added towards the end of the forties of the nineteenth century.

The ship-building yard at Pembroke dates from 1815, and Haul-bowline, begun in 1778 and enlarged in 1865, can be regarded as having been a dockyard only since 1885, when its large drydock was opened.

Formerly the English navy had also small yards, or more correctly naval depôts, in Harwich, Deal, Kinsale (in Ireland) and New York (previous to the war of Independence), nay even in Lisbon, which by the Methuen treaty had become almost an English port.

The English navy is by no means restricted to the performance and capacities of the Royal dockyards, but employs a large number of PRIVATE YARDS in England, Scotland, and Ireland and some of these factories are possessed of great means and resources. Foremost amongst these may be named the firms of Laird Bros. of Birkenhead near Liverpool, and J. & G. Thompson on the Banks of the Clyde for ships and engines of every size; Armstrong, Mitchell & Co., of Elswick near Newcastle, the Naval Construction and Armaments Co., at Barrow in Furness, The Thames Iron works at Black-

¹ "Large" Docks are those which can admit the largest battle-ships and are at least upwards of 300 ft. long, 60 ft. broad, and 24 ft. deep over the sill.

wall for ships of all sizes and many more. The number of DRY-DOCKS in the COMMERCIAL PORTS of the United Kingdom is no less than 249; 203 of which belong to England alone; and although only 14 of these can be called large according to the definition of this term given above, yet many of them have very considerable dimensions; a length for example of some 815 feet, so that they are able to admit even cruisers (all but the very largest) and all ships of less dimension.

The Home Gun-Wharves.

The HOME GUN-WHARVES are in Portsmouth and Devonport contiguous to the Dockyards and those of Chatham are at Upnor in the immediate neighbourhood; their staffs amount respectively to 27, 17, and 21 persons; the police officers are respectively 53, 47, and 24 in number and they employ 572, 307, and 179 skilled workmen. To each of these three establishments is added a torpedo-depôt.

Their material is mostly supplied by the colossal arsenal at Woolwich. Ever since the time of Henry VIII. as has been mentioned before there had been a shipbuilding and fitting yard at Woolwich, but, being rendered unnecessary by Chatham and Sherness, it was closed in 1869 and converted into an Artillery arsenal, belonging to the war office, but still working for the navy also. The arsenal manufactures cannons, gun-carriages, and ammunition; powder is made at Waltham Abbey, and small arms at Birmingham and Enfield. The chief manager, the Director General of Artillery is an eminent expert, a civilian, but the heads of sections are mostly military and naval officers. The works are carried on on business principles. In 1890 the buildings were estimated to be worth about £570,000 and the machinery about £733,000; the arsenal employed some 13,000 workmen, whose weekly wages amounted on an average to nearly £1. 12. 8, the value of the articles produced to £2,300,000, and since then this amount has gone up still higher. Of this sum about 55% are spent on wages, and only 1—3% on administration.

Torpedoes also are made at Woolwich; the productive capacity of the works is 400 torpedoes a year.

Of the staff of the arsenal 35 members belong to the navy, which also employs 399 skilled workmen.

c. The Home Victualling Yards.

Since 1870, when the ship-building and outfitting yard at Deptford was closed, Deptford has been the chief Victualling yard, which supplies the neighbouring ports of Chatham and Sheerness; its official name is the Royal Victoria Yard, and its staff numbers 40 persons, employing 384 mechanics and labourers. Portsmouth harbour has a separate Victualling yard, the Royal Clarence Yard at Gosport employing a staff of 17 persons and 130 workmen; similarly there is at Plymouth the Royal William Yard with a staff of 10 persons and 118 workmen, and finally in Haulbowline there is a small Victualling yard, the Royal Alexandra Yard employing a staff of 4 persons and 14 workmen. Fiftyseven policemen are employed to protect the three larger yards and finally there are at work 77 men as crews of eight Victualling yard craft belonging to the four yards. Deptford bakes a large part of the biscuits and prepares all the cocoa, mustard &c. wanted for the navy; all the stores of victuals, clothing and other articles, whether supplied by contract or bought in the open market are delivered there. When examined and approved of, they are stored and duly passed on to the fleets or other victualling yards. As regards the clothing there is a remarkable difference between the English and the German navies. The English sailors (not the Marines) can on payment of its value, have the cloth supplied them and are allowed to make their clothes themselves, or have them made, but they must in colour and cut conform to the prescribed pattern; nevertheless considerable differences are occasionally observed in different ships.

For victualling and clothing for the navy there were voted in the current financial year £1,921,325. It is worth mentioning that, of the amount voted for victuals, upwards of 57 % are accounted for as savings in kind, sailors on board preferring to receive money payments according to regulations, in lieu of a large portion of the rations due to them; there are naturally certain limits drawn to these transactions, and the men do not get the full money value allowed them, so that as a matter of fact the exchequer effects considerable savings.

d. Hospitals.

There are five hospitals in the home ports, viz: one in each of the three great naval ports and also in Portland, and in Haulbowline;

to these are yet to be added four hospitals for the marines at Forton, Eastney, Plymouth and Walmer and a lunatic asylum at Yarmouth. The hospital at Haslar, opposite to and belonging to Portsmouth, is by far the largest; it employs nine physicians and surgeons, a chaplain, four apothecaries, ten nurses &c.; and there are besides 143 hospital assistants &c., and 56 workmen; in all 229 persons. All the surgeons of the navy, immediately after their engagement, pass through a practical course at that hospital.

At the hospital in Plymouth, which is next in size, there are at work seven medical men; in the other hospitals three to four; of subordinates there are employed in Plymouth 124 and in the other hospitals from 47 down to two. There are engaged in all 26 Nurses; three Senior Nurses whose salaries range from £191.0.0. to £85.0.0. and 23 Sisters with salaries ranging from £94.15.0. to £71.13.4. with free maintenance.

e. Barracks.

Barracks are still in process of formation and little is to be said about them. Part of the reserves are still lodged on board ships in port, but at Sheerness and at the three great naval ports barracks are being built and are partly finished.

B. Naval Stations Abroad.

Of the ten Commanders-in-Chief three, as has already been said, discharge the functions as Admirals Superintendents of the three great naval ports, of the other seven each fills the post of HEAD OF A GREAT NAVAL STATION ABROAD and of the Squadron belonging to it; and according to the size of the station they rank as Rear-Admiral or Vice-Admiral and only rarely as full Admiral.¹ These stations are designated as: 1. Mediterranean, 2. North America and the West Indies, 3. Pacific, 4. China, 5. Australia, 6. East Indies, 7. Cape of Good Hope and west Coast of Africa; to these is yet to be added 8. the South East Coast of America, with but a small squadron under the command of a Naval Captain as Senior officer.² In addition to

¹ The size of the station does not determine the rank of its admiral, though naturally admirals of high rank are selected for stations of greater size or importance.

² Now a Commodore.

The translator.
The translator.

all this there is in the home waters an especially strong squadron, the CHANNEL SQUADRON, whose range comprises, besides the English Channel, the German Ocean and the Baltic, as well as the Atlantic Ocean along the West Coast of France and Spain as far as Africa. It consists of six new mighty battle-ships, two large first class cruisers, and five smaller cruisers &c.; it is commanded by a Vice-Admiral and by a Rear-Admiral as second in command; the former bears the title of Vice-Admiral commanding and not of Commander-in-Chief, probably to avoid friction with the three Admirals Superintendents of the respective naval port to which he is assigned.

There is further employed in the home waters a RESERVE SQUADRON, consisting of five older battle-ships and four large cruisers, with one or two gun-boats added to each; they serve as Coast-guard ships, and though stationed in the different ports of the United Kingdom they can be concentrated in a very short time; they are commanded by the Admiral Superintendent of the Naval Reserves, whose flag at present is hoisted on the battle-ship "Alexandra" stationed at Portland.

Finally we have yet to mention the TRAINING SQUADRON consisting of four older large cruisers. It has no special range assigned to it, but is used for training young sailors and navigates therefore mainly under sail. It cruises generally in the German Ocean and the North Atlantic and is commanded by the Senior officer of the four Captains, who bear the title of "COMMODORE IN COMMAND." The position of a Commodore in England is always such, that the ship bearing his broad pendant¹ never has a special captain on board.

The Commander-in-Chief on FOREIGN stations controls everything that concerns the navy within the range of his station. He has to keep the ships of his squadron within the range of his station and is to make himself acquainted immediately after assuming command with the condition and capacity of his ships, officers and crews, and specially of the commanders and keep himself minutely informed on every detail. He conducts tactical exercises and signal practice with the squadron and keeps a Squadron Journal entering an account of the exercises and also the number of days spent in port and at sea; moreover he makes inspections on entering on his command and subsequently yearly, or more frequently, according to need. These inspections deal not only with manœuvres on board, such as clearing

¹ See diagram of flags.

decks for action, fire alarm &c., but also with such details as bedding, victualling, payment of wages, punishments, mess-accounts and officers' instruments &c. The Commander-in-Chief is to look after the equipment of the ships, so as to have them always prepared to execute any command given; he is also to see after the regular performance of Divine Service.

He is earnestly enjoined to observe all the practices and usages of international comity and to keep up a constant good understanding with the British diplomatic agents &c.

He is chief of all the yards and other Naval Establishments on shore within the range of his station and has to watch over their working; he is also authorized to suspend officials; he visits the hospitals every three months but, like the Port Admirals, he is not authorized to interfere with those branches of the service, which are managed by officers or officials holding the rank of Superintendent. He is to keep the Admiralty constantly informed about the movements of the ships of his squadron, as well as about changes among the officers and surgeons, and he is to make report on all remarkable occurrences of which accounts have arrived at his station. On the first of every month the Admiralty is to be apprised of the distribution of the ships of his squadron. The signal-books are to be sent in once every half year, the log-book once a year, as well as copies of all commands of a permanent character given on the station. He is to propose in good time the discharge of men and the recall of ships that have served their time. When officers are to be relieved, he is to make report on them; and he is in like manner to make report on all the officers who have been under him at least six months previous to the expiration of his own command.

The above named NINE NAVAL STATIONS comprise all the seas of importance to British trade, except the Black Sea, the passage of the Dardanelles and the Bosphorus being forbidden by the treaty of Paris of 1856 to the ships of all nations except those of Turkey. These naval stations are held by 136 vessels of all kinds, inclusive of 34 armoured ships, which are distributed in the several stations according to their relative importance. In any sudden emergency Commanders of neighbouring stations transfer ships temporarily to each other, either upon the receipt of orders from the Admiralty or even upon their own initiative.

The MEDITERRANEAN STATION is the most important and therefore the most strongly occupied of all these stations; its range extends

from the western extremity of the straits of Gibraltar over the whole Mediterranean, the Suez Canal, and the Red Sea. On the first of October 1896 the Mediterranean Squadron consisted of thirty seven ships, inclusive of thirteen ironclads, ten of which were of later and latest types (1882—1892), one armoured cruiser, a ram, and a vessel for coast defence doing duty as guard ships at Gibraltar. The remaining 27 ships are small and large cruisers, despatch boats, fast gun-boats, and torpedo-boat destroyers; also a sailing vessel used as training ship for ordinary seamen; an old ship of the line doing duty as a guardship in the harbour of Malta. Since then the squadron has been greatly reinforced in consequence of the troubled outlook in the Levant. It is generally divided into two sections; the larger part under the Commander-in-Chief himself, at present an Admiral, who mostly attends to the western Mediterranean, and the smaller part under the officer, second in command, a Rear-Admiral, who is mostly engaged in the eastern Mediterranean. To this station belongs also the large yard at La Valetta in Malta which, situated as it is in an excellent, central position in the narrow part of the sea that separates the eastern from the western basin of the Mediterranean, serves as a base of operations for watching the traffic and despatching forces in every direction. It is also specially well fitted for an intermediate stage on the great highway to India between Gibraltar and Port Said. Having a fully protected natural harbour, whose narrow entrance is strongly fortified, it can be easily blocked and therefore successfully defended. This yard, the only foreign one that, like the three great home yards, is governed by an Admiral Superintendent, is provided with men and materials in a corresponding manner; there are directors of fitting, shipbuilding, machine construction and store departments; also a naval surgeon, a chaplain &c. The staff numbers 80 persons, whose pay amounts to £14,841. Of this the Admiral Superintendent, whose flag flies on the old ship-of-the-line, the "Hibernia" draws £1960.0.0.

The yard is fully equipped for effecting repairs of every kind; it possesses four dry-docks, two of which are "large" docks, and is able to make repairs, and even build new ships, albeit on a reduced scale. Most frequently however ships are repaired in this yard, after their commission is expired;¹ they are then fitted out to be "recommis-

¹ A man-of-war's commission generally lasts three years, but ships may be kept in their station some months longer before being relieved. The translator.

sioned" for a second or even third such period, the new crews being brought from home in troopships.

In addition to the dockyard, Malta has an ordnance, ammunition, and torpedo-boat depôt, employing 27 mechanics from the ships; also a victualling yard with 72 workmen managed by a staff of six persons, a hospital with three surgeons, five nurses and fifty hospital assistants &c. Malta serves then to the Mediterranean Squadron as a fully equipped naval port; but being very deep and without current it is exposed to pollution by thousands of sailors and 80,000 inhabitants of the town. Till lately no measures of precaution had been taken, so that the proverbially notorious Malta fever laid low many men; in 1894 no less than 26 officers were ill in the hospital, and several died.

GIBRALTAR offers to the Mediterranean squadron a second *point d'appui*; till lately it had only a small establishment, but it is to be converted at great expense into a naval port, by the building of a skilfully protected harbour and large drydocks, which will of course take some years to finish. At present it already possesses a naval and coal depôt superintended by a post captain with a staff of seven persons, an ordnance depôt, a victualling depôt, and a hospital; £65,000 have been voted for a new hospital, and the other establishments will no doubt also be proportionally enlarged. In a future great war the English navy will possess a splendidly equipped point of support at this supremely important spot, the ingress into the Mediterranean.

The Mediterranean station is neighbour to the EAST INDIES STATION, which mainly comprises the Indian Ocean; it borders in the east the China and in the south-east the Australia, and at Zanzibar it touches the Cape Station.

The East Indies Station is held by eleven ships commanded by a Rear-Admiral, whose flag is hoisted on a large armoured cruiser. The other vessels are smaller cruisers and gun-boats &c., but there are also included two armoured vessels for coast defence and some torpedo-boats stationed in Bombay. These two armoured vessels, two torpedo-gunboats and half a dozen torpedo-boats belong to the Indian Marine, but they are commanded by officers of the Royal navy and manned mostly by crews of the Royal navy, although there exists a small corps of Indian Marine Officers. As a rule one part of this Squadron is stationed off the East coast of Africa under one of the older officers in command, and another in the Gulf of Persia.

Head-quarters are in Bombay, where there are nine dry-docks and a yard maintained by government. Calcutta, too, has ten docks, and both establishments are managed by officers &c. of the Indian Marine. There is also at Trincomalee in Ceylon a Naval depôt managed by an official at the head of a staff of six persons, a Victualling and Clothing depôt, and a hospital. It is proposed to move all these establishments to Colombo. Finally there is an ordnance depôt in Bombay and another in Aden.

To the Naval Budget of the East Indies Station which protects India, the government of India contributes £175,000 a year, of which sum the officer in command of the Squadron draws £680.

Since the war between China and Japan the CHINA STATION has been made very powerful; its range extends from the straits of Malacca to Bering's Straits; eastward it borders on the Pacific Station and southward on that of Australia. The squadron consists of 26 vessels, commanded by a Vice-Admiral, who has under him a Rear-Admiral as Second in Command, and in Hong Kong a Commodore as superintendent of the dockyard and other naval establishments at that place. The squadron comprises one of the new swift battle-ships, which is the flagship of the Commander-in-Chief, four armoured cruisers, eight cruisers of various sizes, several gunboats, despatch boats, torpedo-boat destroyers and finally a large steamer, formerly a troopship and now doing duty as a guard-ship in Hong Kong, and flying the flag of the Commodore. Some of the smaller vessels are of shallow draught for service on the Chinese coasts and rivers. Hong Kong occupies a central position and is the head-quarters. It possesses an excellent and secure harbour with seven drydocks, one of which is a large one; also extensive works managed by a Chief Constructor, a staff of 37 persons all told, besides depôts for ordnance, torpedoes, victuals and clothing, a large hospital with three physicians and 40 assistants &c.—in a word HONG KONG IS A FULLY EQUIPPED BASE OF OPERATIONS. Singapore, also commonly the station of a portion of the squadron, has four drydocks and there is besides a considerable number of these in other ports within the range of the station, though not actually in English possession. There is also a hospital at Yokohama; the naval depôt there was given up in 1889.

The AUSTRALIA STATION, bordering in the north on the China, in the west on the Indies and in the east on the Pacific stations, extends southwards as far as the Polar circle. The Commander-in-Chief is a Rear-Admiral, who flies his flag on board an armoured cruiser.

Besides his flagship his squadron comprises seven 3rd class cruisers and five gunboats, mostly such as the Australian governments ordered in 1889 to be built in England at their own cost, at an outlay of more than £860,000. In case of war these ships are to be employed solely in defence of the Australian colonies; the contribution of these countries to the budget of the navy amounted, for the year 1896/97, to nearly £63,000. The spacious and well protected port of Sydney serves as a base of operations. It possess a repairing yard fully manned and managed by a post captain, who draws a salary of £1250 a year. There are two docks, one of which is a large dock, a naval depôt, an ordnance depôt, and a victualling and clothing store. In addition Sydney has six other docks, and there are numbers of drydocks in other Australian ports.

The PACIFIC STATION, bordering on the China and Australia stations in the east, is the most extensive of all; it stretches from Bering's Straits in the north along the west coast of America to far beyond Cape Horn in the south, that is over 133 degrees of latitude from the Arctic to the Antarctic Circles. Its range touches British territory in Canada on one side and New Zealand on the other and includes the group of English Islands in Polynesia, the most important of which are the Fiji Islands. There being no great naval powers within the whole area of the range, it has only a small squadron, commanded by a Rear-Admiral and consists of seven vessels, viz: one armoured cruiser, which flies the flag of the Commander-in-Chief, five small cruisers and gunboats and one old store-ship permanently stationed at Coquimbo in Chile to supply the vessels sailing the waters of the west Coast of South America.

The port and base of operations of this squadron is the beautiful and safe harbour of Esquimaux in Vancouver Island, where a yard is being built with a large drydock containing an ordnance depôt, a store for provisions and clothing, and a hospital; it is managed by a staff of ten persons. Only lately, that is since the completion of the Canadian overland route, has attention been directed to this important point. The United States have begun to build a yard at Puget Sound near by, a large dock being already finished. In the wide range of this station there are only two more drydocks, which are British, viz: in Auckland, in New Zealand; one of these being a large dock.

East of the Pacific Station lies the STATION OF THE SOUTH EAST COAST OF AMERICA, which extends from Cape Orange (situated at

4 degrees N. on the borders of Brazil and French Guiana) to the Antarctic Circle in the south, and eastward far into the Atlantic. It is occupied by only four ships, as has already been pointed out, one of which, a cruiser of the 2nd class flies the broad pendant of the Senior Officer in command;¹ the other three are smaller cruisers. There is no yard within the range of this station and only a coal depôt lately formed on one of the Falkland Isles.

To the east it borders on the STATION OF THE CAPE OF GOOD HOPE AND THE WEST COAST OF AFRICA, which comprises the Atlantic Ocean from Sierra Leone to the Cape and beyond it to the Antarctic Circle, as well as the Indian Ocean on the east coast of Africa as far as Zanzibar, where the East Indies station begins. The station is in charge of a Rear-Admiral, whose flagship is an armoured cruiser; an older ironclad lies as guardship in Simon's Bay at the Cape; moreover the squadron contains six cruisers, five gunboats &c., a few torpedo-boats stationed at the Cape, two river gunboats of shallow draught, stern wheel steamers on the Zambezi. CAPE TOWN is the base of operations; it is a port strongly protected by art, with a dockyard, managed by a staff of 18 persons, a large dry-dock, an ordnance and torpedo depôt, a store for provisions and clothing, and a hospital. There are also stores for provisions at the coaling stations of Ascension, St. Helena, and Sierra Leone. Of late it has become the duty of this squadron either alone, or jointly with British or Colonial troops to carry on the little wars, which follow one another with great rapidity in the interior of Africa, on the Niger &c.

Towards the north the South America station borders on the STATION OF NORTH AMERICA AND THE WEST INDIES; this latter extends from Cape Orange to the Arctic Circle and comprises also the West Atlantic Ocean. In consequence of its great importance it is in charge of a Vice-Admiral who is Commander-in-Chief; the squadron consists of twelve vessels, among which is a large, new, armoured cruiser, flying the Admiral's flag, an old floating battery doing duty as harbourship in Bermuda, and an old depôt-ship in Port Royal (Jamaica) which flies the broad pendant of the Commodore commanding there; the other nine vessels are cruisers of second and third class and a large gunboat. This squadron has several *points d'appui*: in the north HALIFAX in Nova Scotia, with a small dockyard managed by a staff of ten persons, a drydock for the largest ships, a torpedo-

¹ Now a commodore. The translator.

depôt and a hospital; in the BERMUDAS, in the midst of the Ocean facing the coast of the United States, there is one of the larger dockyards under a captain Superintendent who draws a salary of £900. It is managed by a staff of 35 persons, and contains in addition a floating drydock for ships up to 11,000 tons displacement, a torpedo-depôt and a hospital. At PORT ROYAL in Jamaica there is a small dockyard under a Commodore assisted by a staff of ten persons; also a torpedo-depôt and a hospital with three surgeons and 17 assistants; and there is a coaling station on the Island of ANTIGUA, which possesses a small but excellent harbour. Finally the Island of ST. LUCIA is being fortified and fitted for a base of operations for the West Indies.

The staffs of the TEN FOREIGN YARDS number 225 persons with an average pay of £292. 0. 0. and there are employed 2933 workmen, of whom 157 receive fixed wages averaging £120. 11. 8. a year; the hired men of colour earn from £49. 15. 0. to £55. 0. 0. and the mechanics employed on board ship earn from £80. 0. 0. to £95. 4. 0. a year. The dockyards are guarded by 163 policemen.

The squadrons permanently maintained on these nine foreign stations have lately been strengthened partly by increasing the number of ships, and partly by replacing older and smaller vessels by new, larger, swifter, and altogether more efficient ships; in consequence the English government can without special preparation, call up ships from various stations and concentrate, within a short time, and AT ANY GIVEN POINT an imposing naval force, superior to everything that any other power can produce.

The squadrons find everywhere, on spots skilfully chosen, safe ports and convenient *points d'appui* for independent military operations with the necessary stores, and means for repairing ships and keeping them in good order, and also all needful arrangements for the care of the sick and wounded. Where natural good harbours are wanting, they have been constructed artificially at great cost, as for example at Gibraltar, Cape Town &c. In addition to the establishments founded and administered by government, which we have just enumerated, the squadrons find means and appliances of all kinds, such as dockyards, drydocks, machine-shops, stores (ammunition alone excepted), and especially coal in abundance in British ports all over the globe. This secures to the English navy the Rule of all the Ocean waters and to the British Empire the Rule of the World.

Till about ten years ago these points were badly neglected, be-

cause their great, and under circumstances, decisive importance in maritime warfare were not sufficiently understood, but since then as great progress has been made in this province as in the expansion of the navy. By the Imperial Defence Act of 1888 abundant means were voted to the administration to make up for the neglect of previous years. Down to 1886 many fortifications on the English coast itself were inadequately armed, and abroad the state of things was far worse; the Cape, Mauritius, Colombo, Port Royal &c. were all but defenceless; Gibraltar and Malta, where they fronted the sea, were altogether insufficiently armed; everywhere muzzle loaders only, and some of these very old and not even mounted and so on. The defending forces partly belonging to the army and partly to the navy were under divided commands. By 1892 the six places named above, as well as Singapore, Bombay, Hong Kong, Sierra Leone, Bermuda and Castries Bay (St. Lucia) were supplied with heavy new breach-loaders, quickfiring guns, rangefinders, mine fields, search lights and able instructors for the garrisons; from Halifax to Bermuda^a a submarine cable has been laid for military purposes; St. Helena and Ascension have been garrisoned &c.

Coast Defences.

In a similar manner the coast defences at home, previously sadly neglected, have been rendered thoroughly efficient with much skill and vigour. Previously the Admiralty used unreservedly to entrust to the War Office the management of the laying of mines, and the latter committed the work to the engineers. An examination in 1890, conducted by expert naval officers, shewed that these mines were dangerous to English ships. The same thing happened under similar circumstances in Germany; in 1883 an examination shewed that the mines, with the exception of those retained in the hands of the naval authorities, were dangerous to German vessels. Since the appointment of the mixed COMMISSION FOR THE COAST DEFENCE, consisting of eminent naval and military officers, the mode of procedure has been completely changed. The armaments of the fortifications of Portsmouth, Spithead, the Isle of Wight, &c. are fully up to date, those at the mouth of the Thames are greatly enlarged and strengthened, the entrances into the three great naval ports are made deeper, so that heavy vessels fully equipped may have ingress and egress at all times and tides, the roadsteads of Spithead &c. not being con-

sidered safe from hostile attacks by torpedo-boats; moreover the small entrances into these ports as well as into Portland and Southampton are to be fully closed up by special obstacles to prevent the bars from being crossed. For Southampton alone £14,300 have been voted for that purpose. The efficiency of the bars by mines and booms, of electric lighting, of the coast batteries has been repeatedly tested by trials on large and small scales. It is contemplated to fortify the magnificent harbours of Bearhaven and Lough Swilly in Ireland, of Falmouth and the Scilly Isles, so as to make them useful to English ships and inaccessible to those of the enemy. In case of war these parts would be excellent bases of operations.

A great deal has also been done to protect the commercial ports and to improve the means of communication, which till lately were still much the same as they had been in the times of the Armada. In 1891 of the 680 coast-guard stations more than 300 were at a distance of from $3\frac{1}{2}$ to 35 miles from the nearest telegraph station, and not a single one, it seems, was directly connected with such a station. But since then much has been done in that direction and also in the interest of the saving of life and property on the coast; several lightships too are in connection with the land by telegraphs and telephones. For signalling the Semaphore has taken the place of signalling by flags, as being more reliable and visible at greater distances. The erection of a number of detached forts south of London is planned so as to check, at least for a time, the advance of an enemy, who in spite of all precautions to the contrary, should have effected a landing at or near Dover.

Thus it is seen that during the last decade enormous progress has been made in the naval stations both at home and abroad; greatly to the advantage of England in naval warfare and thus to her preponderance at sea.

V. PERSONNEL.

THE PERSONNEL OF THE NAVY is classified: 1. according to *branch* into: seamen, engineers and mechanics, marines, medical officers, administrators, artificers, cooks, stewards, and servants; 2. according to *rank* into: officers, warrant officers, and crews, which include the

petty officers. Of the different branches each (cooks, stewards &c. excepted) has its own officers.

The officers of the navy are divided into two branches of service, viz: military officers and civil officers; the latter include engineers, surgeons, paymasters, instructors, secretaries and candidates for such careers, and finally, among the warrant-officers, the carpenters. The officers of the military branch are the seamen naval officers, inclusive of gunners and boatswains.

The table on page 112 shows the "Relative Rank" in the two branches of the service, the Navy and the Army.

a. The Corps of Naval Officers.

1. Historical Introduction.

The corps of naval officers has grown gradually. In the Middle Ages ships were as a rule not commanded in battle by seamen, but by knights, or other military officers embarked for the combat. This had been the practice with the ancient Romans and remained so in England till the time of Henry VIII. and often also after him till late into the 17th century. But the advance in the art of navigation, caused by the introduction of the Mariners' Compass and by the improvements and complexity of the rigging, made it possible to engage on distant voyages and enterprizes and so raised the qualifications of navigators and steersmen, that landsmen were wholly unable to assume the real command of a ship. From that time naval men rose in importance and position, and Henry VIII. bestowed the rank of NAVAL OFFICER on the "Master," the navigating assistant of the Captain, and actually the ship's Ruler. Before his appointment, he had to pass an examination at Trinity House, the centre of navigation and of all seafaring matters in England. But it was not till the time of Elizabeth that Seamen by profession were appointed as captains, i. e. independent rulers of battle-ships. This was at the time of the Armada, when the danger of the country loudly called for the "right men in the right place"; and when Drake, Frobisher and others had distinguished themselves by great voyages of discovery and by bold warlike expeditions. Seamen by profession were entrusted also with other high posts, as commanders of parts of the fleet. But still these were not PERMANENT APPOINTMENTS in the Royal service, for, when the voyage or the enterprise was over commandant, officers, and

1. Admirals of the Fleet.	—	—	—	—	—	—	Field Marshal.
2. Admirals.	—	—	—	—	—	—	Generals. ¹
3. Vice-Admirals.	—	—	—	—	—	—	Lieut.-Generals. ¹
4. Rear-Admirals.	—	{ Inspectors-General of Hospitals and Fleets.	—	—	—	—	Major-Generals. ¹
5. Commodores, 1st and 2nd Class.	—		—	—	—	—	Brigadier-Generals.
6. Captains of 3 years' seniority.	Staff Captains of 4 years' seniority.	Deputy Inspectors-General of Hospitals and Fleets.	Secretaries to Admirals of the Fleet according to service in that rank.	Paymasters-in-Chief.	Chief Inspectors of Machinery of Machinery of 8 years' service in that rank.	—	Colonels.
7. Captains under 3 years' seniority.	Staff Captains under 4 years' seniority.	—	Secretaries to Commanders - in Chief, of 5 yrs. service in that rank.	—	Inspectors of Machinery under 8 years' service in that rank.	—	Lieutenant-Colonels.
8. Commanders	Staff Commanders	Fleet Surgeons ²	Commanders - in Chief, under 5 yrs. service in that rank.	Fleet Paymasters ³	Fleet Engineers ⁴ .	—	Lieutenant-Colonels, but junior of that rank.
9. Lieutenants of 8 years' seniority.	Staff Surgeons	—	Secretaries to Junior Flag Officers, Commodores, 1st Class, or Captains of the Fleet.	Staff Paymasters ³	Staff Engineers ⁵ .	Naval Constructors of 8 years' seniority.	Majors.
10. —	—	—	—	Paymasters with, but after, 8 years' seniority.	Chief Engineers with, but after, 8 years' seniority.	—	Majors, but junior of that rank.
11. Lieutenants, under 8 years' seniority.	—	Surgeons	Secretaries to Commodores, and Class.	Assistant Paymasters of 12 years' seniority.	Engineers, under 6 years' seniority, with, but after, Lieutenants, R.N., under 8 years' seniority.	—	Captains.
12. —	—	—	—	Assistant Paymasters under 6 years' seniority.	Assistant Engineers	—	Captains, but junior of that rank.
13. Sub-Lieutenants.	—	—	—	—	—	—	Lieutenants.
14. —	—	—	—	—	—	—	Chief Gunners, Boatswains, and Carpenters with, but after Sub-Lieutenants.
15. —	—	—	—	—	—	—	Second Lieutenant.
16. Midshipmen.	—	—	—	Clerks	—	—	Gunnery, Boat-Swains, and Carpenters.

¹ The relative precedence is not affected by a General Officer happening to be the Lieutenant Governor of a fortress at home.

² In all matters wherein the Army and Navy Administration are concerned Fleet Surgeons will rank with and as Brigade Surgeons.

³ Officers who had attained 12 and 6 years' seniority as Paymaster before 17th February 1886 will take rank from dates of attaining such seniority instead of from dates of Commissions as Fleet and Staff Paymaster.

⁴ Officers who had attained 8 and 4 years' seniority as Chief Engineer before 17th February 1886 will take rank from dates of attaining such seniority instead of from dates of Commissions as Fleet and Staff Engineer.

crews were paid off, and being free again they re-entered civil life, and had to shift for themselves; only a small number of officers and men were retained to look after the ship while laid up in ordinary. This practice greatly stimulated the love of adventure and of predatory expeditions.

A short time previously, in 1580, the rank of *Lieutenant* had been introduced into the navy. The master was the navigator of the vessel but not a combatant; the object in view now was to give the captain an assistant and eventually a deputy or successor in battle, and also to train young men of good family as naval officers from among whom the captains should be selected. The ship, no matter what was her size, had then only ONE lieutenant on her staff, whom the captain appointed himself, mostly from among his relations or friends, but the master was appointed by the Admiralty, and was selected upon the recommendation of Trinity House from the masters' assistants, called "Master's mates", the captain had therefore no authority to depose the master. The appointment of lieutenant, notwithstanding the reform of replacing captains, who owed their posts to favouritism, by seafaring officers of experience, made but slow headway and seamen by profession often felt sorely aggrieved that inexperienced young gentlemen of quality were promoted over their heads to the post of captain.

The same thing happened when in 1649 at the time of the Commonwealth Blake and other Colonels of the Army were made "Admirals and Generals at Sea"; nevertheless Cromwell, who knew his men well had made a wise choice. Still such occurrences were the cause of much tension and friction between the officers of the two arms of the service, which formerly used to cause no little inconvenience in the conduct of the war, and has even now not yet wholly disappeared.

THE RECRUITING OF NAVAL OFFICERS FROM AMONG THEMSELVES had begun much earlier. At the time of Queen Elizabeth every commandant was entitled to keep on board two servants for every 50 men in the crew, and captains of eminent families were allowed double that number. In practice they only kept a part of the number of servants and pocketed their allowances. Nevertheless this system opened a way for youths of good family to enter the navy as cabin-boys. In manœuvring they were placed amidship between the main-mast and the mizen mast with that part of the crew which was called "waisters" or "midshipmen"; this name was transferred to the lads who worked with them, but under the eye of the captain and were

taught the duties of the petty officers and of helmsmen. The title of midshipman gave no claim to a higher career. Down to the middle of the 18th century and later, midshipmen were a very mixed company; many remained in this position for decades or even during the whole time of service, or became petty officers, or master's mates, and only a very limited number entered the ranks of officers, little labour having been bestowed on their education for a long time. In order to secure means for recruiting the corps of naval officers Charles II. introduced in 1676 the practice of admitting lads of good family as "Volunteers" with "King's letters," of which every ship was allowed to take on board a fixed proportion according to the size of the ship; they were not to be more than 16 years of age and at once drew £22. 10. 0. a year pay. Shortly afterwards regulations were made for their promotion to a lieutenancy; viz: three years service at sea, one year of this time as midshipman; age not less than 20, good certificates for service and conduct and passing an examination conducted by three naval officers.

This is to be regarded as THE FOUNDATION OF THE CORPS OF NAVAL OFFICERS; from that time forward no one could be appointed to the rank of captain, who had not qualified for a lieutenancy, which necessitated a service of several years in the lower ranks. In 1703 the number of years of service at sea was doubled by being raised from three to six. Nevertheless there still existed three modes of gaining admission into the corps of naval officers; 1. As "Volunteer" for lads of good connections and favoured in the highest quarters; 2. As servants in the manner explained above—a kind of appointment, which existed till 1794, and has given to the fleet more than one admiral; for example Admiral of the Fleet Sir Provo Wallis lately deceased at a very advanced age, and finally: 3. As apprentice on merchantmen, whence the lads were transferred to the navy, a practice, which prevailed down to 1815; this was the introduction that Admiral Benbow had, and also Captain Cook.

With reasonable talent, skill and good fortune a lieutenancy might be reached by any of these ways, but PROMOTION beyond was very difficult. Sometimes it was by merit, but more commonly by favour and influence of family, relatives and friends, in one word by "interest", which was perhaps never and nowhere so powerful as in England in the 18th century and till comparatively lately.

Down to the time of Charles II. Naval Officers drew pay only during the time that their ship was in commission; and the amount

of the salary depended on the rank of the ship. When she was laid up in ordinary, salary and service came to an end from the Admiral down to the cabin-boy; the whole crew dispersed and each went his own way. To prevent this dispersal of the officers HALF PAY was introduced in 1667 for the captains, and some years afterwards also for the senior officers and thus there was founded a PERMANENT STAFF OF NAVAL OFFICERS, whilst up to that time only warrant officers and pursers had been retained in permanent employment with their ship. In the following year, in 1668, men-of-war were forbidden to carry goods and merchandise for pay; officers were thus no longer exposed to the degrading influences attendant on the gross abuse of this privilege, and the public service was freed from its pernicious effects. To indemnify the commandants for this loss of income, Table Money was allowed them, ranging from £255 for a ship of first rank, to £83. 10. 0. for a ship of sixth rank and they were ordered to send in a report of their voyage. In 1693 the pay of all naval officers on board (except the captains who had already been previously provided for) was doubled and half-pay was extended to captains down to ships of the 5th rank and also to all senior masters, who had served at sea for a twelvemonth or had taken part in an engagement; the number of "servants" was considerably reduced and naval officers on half-pay were allowed to travel in foreign countries. In 1718 the promotion from post captain to the rank of Admiral had been regulated according to SENIORITY OF SERVICE, but in 1747 this was superseded by promotion by selection. Towards the end of the century the system of "servants," which had led to great abuses, was largely restricted, officers being allowed to keep only one twentieth of the number hitherto permitted, but in their stead real cabin-boys of 15 to 17 years of age were to be taken on board, and one fifth of these had to be lads of good family "gentlemen volunteers", who expected to become officers and who were to be at least 11 years old. Since 1844 these "volunteers" have been called "naval cadets," but till about 1860 no change was made in the age of admission (12—13 years). Up to then there existed two systems of appointments and early training of cadets; some were nominated by the Admiral or Captain and taken on board at once, where they received theoretical teaching from a Naval Instructor and practical training in actual service; others were nominated by the First Lord of the Admiralty and sent for one year to the Naval College at Portsmouth, which was then under the direction of the able Professor Inman, where they were

taught principally navigation, but became also acquainted with the working of the dockyard; then they were sent on board.

The rank of SUB-LIEUTENANT was created in 1802 by Admiral Jervis, when he was First Lord of the Admiralty; after 1864 the officers between the midshipmen and the lieutenants were officially designated as "Mates."

Formerly Admirals and Captains were allowed on being transferred to another ship to take with them, as "followers", a certain number of officers or of the crew; but as this had led to much inconvenience it was abolished together with the usage that the admiral on board, on hauling down his flag, promoted a lieutenant to commander.

The "Masters," who formerly played an important part on board, but were not counted among the executive naval officers, were organized into an especial branch of the service, THE NAVIGATING BRANCH; they received special training in navigation and could rise to the post of Staff-Captain, but could *not* become Admirals. The ranks of this branch of the service are: navigating lieutenant, staff-commander, and staff-captain; formerly there was on board of each ship an officer of this class, who was in charge of the whole of the navigation, and of all that pertains to it, and had other particular duties, especially the superintendence of the loading of the ship. This corps was not recruited from the same social stratum as the other naval officers, and this affected their status somewhat awkwardly. In the service too they did not enjoy equal rights, even staff captains ranking on board below lieutenants when on duty. The inconveniences resulting therefrom being considerable, this branch of the service has been allowed for the last 30 years to die out gradually; every naval officer is now required to be skilled in navigation also.

At present there only exist 70 Navigating officers of that branch; the staff-captains being mostly employed in the dockyards and in the hydrographic service, and the younger members as navigating officers on board large ships.

Warrant officers are occasionally promoted to the rank of lieutenant as a mark of special distinction; but these cases occur so rarely that they have no influence on the corps of naval officers, which remains practically a closed body and has been recruited in the same spirit since the establishment of the Naval Training College, the "Britannia" at Dartmouth. Now we will describe the system that prevails at present, although some changes are in prospect.

2. Present Organization.

Three times a year in March, July, and December candidates of whom there is never any lack, are admitted to the Entrance Examination. As a rule the First Lord of the Admiralty nominates the candidates, but a few are also nominated by the other Lords and by the Secretary of the Admiralty; moreover there must always be nominated six candidates from the colonies on the recommendation of the Colonial Secretary and five sons of naval and military officers, who have died in the service; besides which the two private training ships, the "Conway" and the "Worcester" each have the right to nominate one candidate a year;¹ finally every flag officer, on assuming command on board, and every Post-captain on entering on his *first* command has the right to nominate one candidate who must be at least 12 years of age. The following are the terms of admission to the examination: the candidate must be $14\frac{1}{2}$ to $15\frac{1}{2}$ years old, free from bodily defects, and ought, if possible, to be able to swim. The examination is COMPETITIVE, and takes place in London and in Portsmouth; as a rule no more than one third pass. An examinee, who has failed may try once more. The Examination for a *simple* i. e. "qualifying" pass, for which the student must at least "satisfy the examiners" comprises the following subjects: Arithmetic, Geometry, Algebra, English, French and Religious Knowledge; the Voluntary subjects, which make it possible to attain a higher place comprise the same three branches of Mathematics, but with more advanced problems, and also Latin, Geography, English History, and Drawing both freehand and geometrical. By way of an example as to the kind of questions given we may quote the following: English Essay: "John Bunyan and his works"; English History: "Description of the Campaigns of Edward I. and Edward II. in Scotland", or, "What were the parts played by Wolsey, More, Cranmer, and Cromwell in the Reign of Henry VIII?" or: "Narrate the chief voyages of discovery in the reign of Queen Elizabeth, and describe their effect on the future history of England"; in Geography: "What is understood by the scale of a map, and in how many different ways is it indicated?" "How may its place be supplied on a map where it is wanting, by means of the latitudes and longitudes of places?" or: "Name instances,

¹ With some modifications in the terms of admission; see Navy List.

The translator.

where the geographical names have reference to the previous inhabitants of the country"; in Religious Knowledge: "Short account of the reign of Ahab or Hezekiah, with one or two lessons to be drawn from it", or: "What do you know of Deborah, Naomi and the Queen of Sheba?" Of such questions seven to eight must be answered in History and Religious Knowledge.

Candidates who have passed, enter the training ship "Britannia" as NAVAL CADETS; the "Britannia" does not merely mean the old wooden vessel of 121 guns launched in 1860, but two ships of the line at anchor, joined by a bridge, fitted up internally with comfortable living, sleeping, and schoolrooms; to this accommodation are added rowing and sailing boats of all kinds and a screw sloop, and close by on shore a number of play-grounds. The cadets must themselves defray the cost of their outfit, amounting to about £40 and have to make a yearly payment of £75. Eight cadets at most, if they are sons of officers, or of officials under the Admiralty, and are in somewhat straightened circumstances, may, at the option of the Admiralty, have their fees reduced to £40 a year. Moreover cadets have to defray their personal expenses, such as washing, repairing boots and clothes, pocket money &c. and they receive no pay.

The period of training on board the "Britannia" lasts four terms; and there are three terms with 13 week's vacation in each year. The education comprises in addition to the usual scientific subjects, the elements of Seamanship, Navigation, and Nautical Astronomy. At the conclusion of each term there is an examination in which special stress is laid upon Seamanship. A lad failing in two examinations, or proving himself otherwise unfit, is discharged. The rank a lad attains in the service depends on the result of his examination; the time spent on the "Britannia" may, if the examination is successful, be counted as a year's sea-time. The best youths of this class at once become MIDSHIPMEN; the others have to earn the post on board by actual service at sea; if they then prove themselves duly qualified they receive their appointment. In this way out of 125 naval cadets about 116 a year become midshipmen; but this number is now quite insufficient owing to the enormous increase given to the navy; it is intended therefore to admit to the examination 190 naval cadets every year with the hope that this will yield 170 midshipmen.

All those who have passed the "Britannia" are as soon as possible put on board sea-going men-of-war that have a naval instructor on the staff, where their scientific education is continued. Seamanship,

gunnery and torpedo practice are taught by a lieutenant, machinery by a proficient engineer, and other duties, such as *watchkeeping, heaving the log, mustering the watch, working out observations, keeping a log book* and the like, are discharged under the superintendence of an officer; each lad is, moreover put in command of a boat, which he has to look after and which gives him frequent opportunities of improving himself, of gaining experience, and of shewing his mettle. A cadet's pay on board is 1/— that of a midshipman 1/9 a day; and his friends must contribute in addition £50 a year, which is paid out to him in periodical instalments with his pay; with this money he is expected to defray his mess and all other expenses.

The Midshipman must have seen $4\frac{1}{2}$ years' SEA-SERVICE before he is admitted to the officers' examination. During the time he spends on board he has to pass yearly examinations in Seamanship, Navigation, Gunnery, Torpedo-practice, Mechanical engineering, Use of instruments, and he has to produce his work-book and log; his answers and essays are forwarded by the Commander-in-Chief of the naval station to the Education Board at Greenwich. The OFFICERS' EXAMINATION comprises Seamanship, Navigation, Pilotage, Gunnery and Torpedo practice. The examination in Seamanship is conducted orally by three senior naval officers, mostly on board and often in foreign waters; having passed that, the midshipman, now 19 to 21 years old, is made ACTING SUB-LIEUTENANT by the Commander-in-Chief of the station and then he is sent home at the first opportunity to be examined in scientific subjects. There he first of all attends at the Greenwich Naval College, a six weeks' course in Mathematics, Navigation, Surveying, Engineering &c. and he is then examined in Navigation. Upon this follows a short course in Pilotage; next comes a course of one month's duration in the torpedo training-ship "Vernon" in Portsmouth, and a course of nine weeks' duration in the gunnery training-ship "Excellent" also at Portsmouth. These several periods were reduced in the Autumn of 1895, the deficiency of naval officers making it desirable to draft off the sub-lieutenants as quickly as possible into active service again.

Repeated failures in any one of these examinations is followed by discharge from the service; on the other hand those who pass high in all branches receive prizes, and the best are promoted to the rank of LIEUTENANT immediately, and the next best after three, six, or nine months. The other sub-lieutenants, who are promoted by seniority, remain two, three, or even four years in that rank, according

to the vacancies that arise; four years however is the utmost according to regulations. With the present dearth of Officers promotion is rapid.

It is seen then, that in this most ancient and grandest of all navies great stress is laid on ENTRANCE INTO THE NAVAL SERVICE AT A VERY EARLY AGE; the authorities being convinced that intending naval officers should be accustomed to the privations and hardships of life on board and to the peculiar circumstances and dangers attending a seafaring life before they have been spoiled by the amenities of life ashore, that they SHOULD FEEL AT HOME AND AT EASE ON THEIR SHIP AND ON THE WATER, and not suffer from home-sickness; that on the one hand the habit of prompt and implicit obedience, and on the other, that of acting on emergencies on their own initiative and responsibility should come to them as a second nature.

Considering the numerous and varied practical and theoretical qualifications of a naval officer, less value used to be attached to general school education than to the technical training for the exercise of their calling, which was put in the fore-ground. That was all very well in the time of wooden ships-of-the-line and frigates, when the different vessels closely resembled each other in simplicity of structure and internal arrangement, and when the whole armament consisted of smooth bore guns and small arms. During the last 40 years however the scientific and technical attainments demanded of a Naval Officer have risen enormously; modern ships exhibit in build, arrangements and armament types of extraordinary difference and variety, and are genuine works of art with their engines and contrivances amounting sometimes to the number of 100. Merely to UNDERSTAND these requires great familiarity with numerous branches of science. The school education therefore of a naval cadet entering the service at so early an age now no longer suffices for the further studies of a naval officer, and rigidly as the people in England are wont to adhere to tradition and old practice, yet great changes are in prospect. The age of entry has been raised by one year and it is anticipated that the entrance examinations will be stiffer, so that the cadet on quitting the institution at Dartmouth, which is to take the place of the "Britannia" will have laid a foundation for his scientific studies, adequate to the continuance of his technical training.

The PERIOD OF SERVICE AT SEA that has to precede the appointment to the rank of naval officer will be adhered to, for INTIMACY WITH THE SHIP AND WITH THE SEA, such as is acquired only by long habit is the foundation for that permanently solid performance in all seas

and climates during a protracted absence from home, which is demanded of all officers by the exigences of the English naval service.

A great stimulus to exertion in the early years is the importance attached to the ATTAINMENT OF A SUB-LIEUTENANCY. It has already been mentioned that the best are made lieutenants immediately or speedily, and that they have the prospects of further promotion; but those who only just pass the examination and either will not or cannot apply themselves to work, may at once renounce all hope of advancement; the subsequent promotions being made by selection and not by seniority, they will remain LIEUTENANTS to the end of their days.

This rank which has the same relative value as that of a captain or major in the Army, is the only intermediate one between the position of a sub-lieutenant who is a mere subaltern, and that of commander; it is therefore well filled and at the present moment is held by nearly 900 officers. One may say, the lieutenant is the officer of the watch on board, and is, next to the captain, responsible for the due discharge of all duties on board. Sometimes lieutenants are employed elsewhere; some are, for example, put in command of torpedo-boats and other small vessels, or are employed as teachers and instructors on training ships &c. With the present dearth of officers they are immediately ordered on board after they have passed their examination, and are sent to some naval station, where they find employment on various service as officers of the watch, or of a division of men, or as gunnery or torpedo officers, or in landing parties &c.

In the autumn of 1895 the deficiency in the number of lieutenants made itself felt so urgently that 100 lieutenants and sub-lieutenants of the Naval Reserve, who had proved their fitness by long service on board of men-of-war were exceptionally appointed as "Supplementary Lieutenants and Sub-Lieutenants" thus breaking through the strict regulations of the service, and it looks as if this precedence would continue till the great gaps now existing are filled by the appointment of larger numbers of naval cadets. These supplementary officers have, however, a limited prospect of promotion, and but few will become Commanders, and these quite exceptionally.

An officer ambitious to advance in his career must distinguish himself in some special branch of the service; he must become a specialist. Immediately after having passed his officer's examination the sub-lieutenant may apply for leave to enter the NAVIGATING BRANCH,

and he may calculate on his admission, if he has passed high in the examination in Navigation and Pilotage; he is then, even when yet sub-lieutenant, employed on board as Navigating Officer, and his salary is increased by $1/6$ a day. Contrary to the regulation as to Officers of the Navigating Branch in former days, he is entitled to promotion to the highest posts, and if he is unusually able and trustworthy his position offers him good chances of being brought under notice and recommended.

Lieutenants, who have seen one year's service at sea during their lieutenancy may apply for admission to the GUNNERY AND TORPEDO SCHOOL; this admission also will mainly depend on the result of their examination in these branches; if it is granted, the officer will have to pass through courses of studies of 20 months' duration; beginning with a theoretical course of nine months at Greenwich; viz: from the 1st of October to the 30th of June, comprising lower and higher Mathematics, Statics, Mechanics, Physics, Chemistry, Electricity, Mechanical Engineering, Drawing, and Fortification. This is followed, FOR THE STUDENTS OF GUNNERY, by a three months' course in the torpedo training-ship "Vernon" at Portsmouth, ending with a final examination. Next comes a practical course of nearly six months' duration in the gunnery training-ship "Excellent," also terminating with a final examination. (The name "Excellent" has been retained, although the ship in question was given up in 1890, and the institution has been transferred to Whale Island at Portsmouth.) This course of studies deals with Artillery of every kind and position, from the heaviest turret-guns, down to machine-guns; also with field (landing) guns and small arms; likewise with the use of the necessary tools and instruments, practising the crews in the use of these armaments and in field as well as torpedo-service; finally the officer has to write theoretical essays and deliver a lecture.

The STUDENTS OF TORPEDO have to pass through a three months' preliminary course in the "Vernon" followed by a two months' course in the "Excellent" and terminating with a Leaving Examination; next comes a five months' course on the "Vernon" in the practical Torpedo Service and in surveying also concluding with a Leaving Examination. The practical Torpedo Course with its examination deals with Electricity for naval purposes, Whitehead Torpedoes, the general Torpedo and Mining Service including range finding, and gunnery, and also tests the capacity for becoming Instructor.

Those who have passed the examination and are found to be bodily fit for it, pass through a 14 days' practice in diving; otherwise only two days' exercise in the use of divers' dress and of the air-pump.

The Examination Certificates are numbered 1—3, according to the number of marks obtained, on which will depend the subsequent additional allowances to the pay. Those lieutenants who have gained a FIRST CLASS CERTIFICATE are, as a rule, retained in the training-ship for a year as Instructors and then receive the most coveted appointments as Gunnery or Torpedo Officers on large seagoing vessels, especially on flagships, where they come under the notice of their superiors and have the best opportunity of turning their abilities to account. Gunnery and Torpedo Officers receive, while on board, additional allowances of from $1/6$ to $3/6$ a day, according to the class of their several certificates. After three years they have to pass through a requalifying course of six weeks in the Gunnery training ship and of $2\frac{1}{2}$ months in the Torpedo training-ship.

In addition there are also OTHER COURSES OF INSTRUCTION given in these ships; e. g. an eight weeks' course for junior naval officers in gunnery, torpedo practice and mines; other courses again for officers on half pay &c. All midshipmen and naval officers in vessels in home stations are required as far as possible, to pass through such a course, the schools at Devonport and Sheerness being, in addition to the "Excellent," available for gunnery. It is seen then that MUCH is done for the education of naval officers in both these important branches of service, so that men of talent and industry have abundant opportunity of distinguishing themselves even in times of peace and of gaining promotion to higher posts.

It is different with such studies as the conduct of war, strategy and tactics, the history of naval war, coast warfare &c. for which little provision is made; only occasionally courses of lectures are given on these subjects in the Naval College at Greenwich. The prevailing view is that the lieutenant must become acquainted with naval tactics by practical work in the squadron; no doubt this is the best school of all, provided always, that the students, who have had no previous theoretical training find abundant opportunity for a thorough study of ALL tactical eventualities which is far from being the case with all these students, and perhaps applies only to very few of them. A striking instance was afforded in 1893 by the loss of the Syrian

Coast of H. M. S. "Victoria," the flagship of the Mediterranean Squadron.¹

Able lieutenants, of tried experience and somewhat well connected, who have served from 10 to 15 years, of which four years at least must have been spent at sea, may reckon on being promoted to the rank of "Commander." As these appointments are made by selection, great inequalities frequently occur. For example on New Year's Day 1891 fifteen lieutenants received promotion; of these the oldest was already 40 years of age, the youngest only 32, the average age being $36\frac{1}{2}$ years; but according to seniority of service, the first was the 60th on the list, the second the 84th and so on; the last the 262nd who was thus promoted over the heads of 247 of his predecessors! Many, as has already been said, never get beyond the rank of lieutenant, partly because considerations of health or of family affairs prevent their serving on foreign stations; of these some join the coast guard, or remain in the service till they have reached the limit of age, their 45th year, when they accept their discharge and are pensioned off. Naturally this gives much cause for bickerings and discontent, all the more as it is impossible to avoid old lieutenants who have been passed over being put under the command of an officer, who had been below them in rank and in seniority.

The COMMANDER is employed as "Executive Officer" in battle-ships or first class cruisers; or as captains of third class cruisers, corvettes and training ships of every size. He must have a minimum of *two years' service*, of which at least one year must have been in a *seagoing vessel*, ere he can become captain; this latter condition is not set aside, even if he has gained distinction in battle such as would have secured advancement. This promotion is also by selection, but passing over the heads of able and industrious officers occurs in these ranks far more rarely than with the lieutenants. Nevertheless of the six commanders promoted to post-captaincies at Christmas 1889 the first was the 43rd and the last the 86th in the list of seniority; but it must be taken into consideration that of the first 42, most had joined the coastguard and had often been passed over, and that those between the 43rd and 86th had no need to abandon all hopes of advancement. The average age of those promoted in 1891 was $41\frac{1}{2}$ years, and the duration of service in their rank was from 6 to 8 years.

¹ Competent judges maintain that this was an accidental mistake of the ablest tactician in the service. The translator.

Captains command battle-ships of first and second class, and the important training ships, the "Excellent" and the "Vernon;" sometimes they serve as Captains of the Fleet of large squadrons, or as Commodores of small squadrons, or as Heads of Departments in the Admiralty and the like. Their number being greater than is required by the effective services, they are commonly without employment on half pay for three years; at this present time there are 59 in that position.



Captain H. R. H. The Duke of York.

This period of leisure is generally employed in attending a higher course of studies in the Naval College at Greenwich, and gunnery and torpedo courses in the above named training ships. When he is afterwards appointed to command a ship, he has to discharge numerous and very various duties, both with respect to the *personnel* and to the *matériel*; duties which require a man of weight and OF THOROUGH TRAINING IN ALL BRANCHES OF TECHNICAL KNOWLEDGE; for although he is assisted by able officers in the several branches of service, such as Navigation, Gunnery, Torpedo, Mechanical En-

gineering &c., yet he must never be **DEPENDENT** on them, but must **DOMINATE** his whole range of duties and responsibilities; in a word, he must be to the whole of the crew, both officers and men, **EDUCATOR AS WELL AS INSTRUCTOR**. Such functions can be discharged only by the **BEST AND ABLEST MEN** on board of a modern man-of-war. At first this officer has a salary of about £420, but if he is among the fifty highest men of his rank, his salary amounts to about £615, and



Emperor William II.
Honorary Admiral of the Fleet.

inclusive of the additional allowances, which vary from 7/— to 18/— a day, it may mount up to £950 a year. At the age of 50 he may claim to be pensioned but this rarely happens; at 55 he is superannuated and must retire. The pension amounts to about £610 a year. A Captain must remain 15 to 16 years in that rank, before he is promoted; anyone then, who has not attained a Captaincy before he is 40 years of age, has no prospects of being made Admiral.

Promotion beyond the rank of Captain is not made by selection, but by seniority; this regulation has not been departed from, even

in the case of Nelson. The highest post in the navy however, that of Admiral of the Fleet is awarded by selection. For example H. R. H. Prince Alfred of Great Britain and Ireland, the present Duke of Coburg Gotha is an English Admiral, who had to wait 13 years after attaining his Captaincy, before he could be made Rear Admiral; similarly H. R. H. the Duke of York, the future King of England, who has already been Captain for 5 years and is the 105th on the



Prince of Wales.

list of seniority has to wait till all the men above him, have been promoted or quitted the service before he can become a Rear-Admiral.

Promotion to the rank of Flag Officer can only occur as vacancies arise, the number of flag officers being limited by regulation; only such admirals, as up to the age of 60 have not actually served in that capacity are compelled to quit the service. The number of flag officers (admirals of various degrees, who are so called because they carry a special flag on board as sign of their office) is 67; viz:

2 Admirals of the Fleet,
 10 Admirals,
 20 Vice Admirals,
35 Rear Admirals, so called because formerly they commanded
67 the rear of large fleets.

Admirals also do duty, as Commanders-in-Chief and Heads of Stations at home and abroad; as Heads or Second in Command of large squadrons, as Port Admiral of the four great naval ports; as Naval Lords of the Admiralty and as President of the Naval College at Greenwich. No Admirals of the Fleet hold command at present.

Besides the admirals on active duty, nearly two thirds of whom, 47 in all, are on half pay, the English Navy has two honorary Admirals of the Fleet (or as the Germans would call them Admirals of the Navy *à la suite*), viz: His Majesty William II. German Emperor, and King of Prussia and His Royal Highness, the Prince of Wales.

The number of captains of the navy, of whom there were 187 on the 18th of March 1898, is to be raised to 208 in the year 1903, by a yearly increase of three or four; similarly the present number of 284 commanders is to be raised to 304 by a yearly increase of five, and that of the lieutenants from 931 to 1150. The number of sub-lieutenants is not fixed; it depends on the number of lieutenants. Inclusive of the present number of 235 sub-lieutenants, the corps of naval officers now consists of 1704 members, but is to be increased by the year 1903 to 1730, exclusive of the sub-lieutenants; if these are added in, the number of naval officers may possibly be 2100 or more.

Scale of Pay of the Officers of the Navy.

Rank	Full Pay		Half Pay	
	Year of 365 days	One day	Year of 365 days	One day
Admiral of the Fleet	£2190 0 0	£6 0 0	£1222 15 0	£3 7 0
Admiral	£1825 0 0	£5 0 0	£766 10 0	£2 2 0
Vice-Admiral	£1460 0 0	£4 0 0	£593 2 6	£1 12 6
Rear-Admiral	£1095 0 0	£3 0 0	£456 5 0	£1 5 0
Commodore of the First Class	£1095 0 0	£3 0 0	—	—
Captains-To the first 50 . . .	£602 5 0	£1 13 0	£301 2 6	£0 16 6
ditto-to the next 50 . . .	£501 17 6	£1 7 6	£264 12 6	£0 14 6
ditto-to the remainder . . .	£410 12 6	£1 2 6	£228 2 6	£0 12 6
Commanders	£365 0 0	£1 0 0	£182 10 0	£0 10 0 or ¹
			£155 2 6	£0 8 6

¹ To each of the first 100, if he has served one year on Full-Pay as Com-

Rank	Full Pay		Half Pay	
	Year of 365 days	One day	Year of 365 days	One day
Lieutenants { Under 8 years' seniority	£182 10 0	£0 10 0		£0 4 0 ¹
{ Of 8 years' seniority and 6 years Service, of which 3 have been in a Ship of War at Sea	£219 0 0	£0 12 0	from £ 73 0 0 to £155 2 6	£0 8 6
	£255 10 0	£0 14 0	according to years of service &c. ²	
Sublieutenants	£91 5 0	£0 5 0	£45 12 6	£0 2 6
Midshipmen	£31 18 9	£0 1 9	—	—
Naval Cadet	£18 5 0	£0 1 0	—	—

To these payments have yet to be added allowances, which vary according to the post filled and are sometimes of very considerable amount. Thus the Commanders-in-Chief on Foreign Stations or at Portsmouth receive £1642 a year or £4. 10. 0. a day for Table Money; those of Plymouth and the Nore, as well as Commanders-in-Chief of independent Squadrons £1095 a year or £3 a day; those Second in Command in Foreign Squadrons £730 a year or £2 a day; ditto in Home Squadrons £547. 10. 0. a year or £1. 10. 0. a day; the same allowance is also made to the Admiral-Superintendent of the dockyard at Malta. Admiral-Superintendents of the dockyards at home receive £730 a year or £2 a day; the Admiral of the Naval Reserve draws £1095 or £3 a day. Moreover the Commanders-in-Chief of home Stations receive from £500 to £250 a year as Commuted Allowance in lieu of Retinue of Servants, so that the total service-revenue of a Vice-Admiral if he is Commander-in-Chief at Portsmouth amounts to more than £4000 a year; at Plymouth to nearly £3500 a year; the revenue of a Rear-Admiral in charge of any of the three great dockyards at home amounts to upwards of £1850 a year. A Commodore of the Second Class, if he is a senior post-captain and commander of a squadron abroad draws for Salary, Table Money, Command Money, &c. close upon £1700 a year; a Captain of the Fleet upwards of £1100; Captain of the "Excellent" draws £866 and

mander the higher amount. To the remainder and those who have not served as above the lower amount.

¹ In lieu of 8 years read 3 years for Half-Pay. See Navy List.

² For fuller and more detailed information see Navy List.

so on. The captain of a ship with a crew of more than 400 men, and also the Chief of the Staff of a Squadron receive each an extra allowance of £335, other captains have smaller allowances, but even those of harbour ships with crews of less than 400 men receive £130 a year. Aides-de-Camps to the Queen draw allowances varying in amount; some exceeding £370 a year.

A Commander if in charge of a Ship of War at Sea draws an additional allowance of £68. 8. 9. a year; if of a harbour ship £46. 10. 0. a year; as Navigating Officer on board he receives from £74 to £90 a year, and if he is on board a flag-ship he has a still further augmentation of £74. 9. 0. a year.

A Lieutenant when in independent command of a ship or tender, draws as command money in addition to full pay £68. 8. 9. a year, as Senior Executive Officer on board £45. 12. 6. a year, as Senior Lieutenant on board £27. 7. 6. a year, as gunnery or torpedo Officer according to the grade of his examination certificate from £27. 7. 6. to £63. 17. 6. a year, for navigating duties £45. 12. 6.; for ditto if of 5 years' seniority £54. 15. 0.; for ditto if passed for First Class Ships for pilotage, without regard to seniority £73. 0. 0. and if for navigating duties on a flag-ship as further addition to the latter £54. 15. 0., so that even as junior lieutenant his pay may mount up to about £315 a year.

Also for Surveying Pay considerable sums are set aside. An officer for example, superintending a survey at home draws an extra allowance of 13/6 a day; ditto abroad 20/- a day; a lieutenant engaged in a similar duty draws for a survey at home 10/- and abroad 15/- a day; assistant surveyors receive from 2/- to 7/- a day at home and from 2/6 to 8/- a day abroad, and so on.

Flag Officers and Commodores are very well and even richly provided for; they alone draw TABLE MONEY. As officers holding positions of less seniority do not enjoy this advantage, it seems that the mere pay of lieutenants and sublieutenants is scanty, especially if the reduced purchasing power of money in England is kept in view. The practice of making additional allowances seems perfectly justified, and this all the more as they stimulate the men to increased efforts in their work; on the other hand of course the door is opened wide to favouritism.

To the corps of naval officers have yet to be added the still surviving officers of the NAVIGATING BRANCH which was formed from

the former MASTERS or SAILING MASTERS; a body of officers, which is being allowed to die out. There are still living 15 staff captains and 56 staff commanders; i. e. 71 officers all told, who are to be gradually replaced by a corresponding increase in the number of posts in the executive branch. The staff captains are mostly employed in the dockyards as harbour masters, or on surveys &c. the staff commanders as navigating officers in battleships &c.

Of the naval officers above enumerated 199 are on half pay, viz: 47 admirals, 59 captains, 42 commanders, 40 lieutenants and 1 staff-commander of the navigating branch; besides these there are 1057 officers on RETIRED PAY, that is officers, who have reached the limit of age, or have quitted the service for other reasons.

Admirals of the fleet¹ are RETIRED at the age of 70; admirals and vice-admirals at the age of 65, or at any age so soon as 10 years have elapsed, since their flag was hauled down, or (if they have not hoisted their flag at all since their service as captain ceased); rear admirals in the same circumstances as those last described at the age of 60; flag officers, who have not hoisted their flags as flag-officer are retired at the age of 60.

Admirals and vice-admirals have the option of retiring at the age of 60, and rear-admirals at the age of 55.

Captains are to be retired at the age of 55, or at any age, if 7 years have elapsed since they last served; they are to have the option of retiring at the age of 50.

Commanders are obliged to retire at the age of 50, or at any age, if five years have elapsed since they last served; they have the option of retiring at 45, or even at 40.

Lieutenants are retired at the age of 45, or at any age, if five years have elapsed since they last served; they have the option of retiring at 40. These naval officers draw Retired Pay but no Pension. Pensions are given only to former warrant officers; at present 203 in number.

Of 1057 Naval officers on retired pay, 64 are admirals, 150 are captains, 247 are commanders, 413 are lieutenants, and 14 are sub-lieutenants; 33 are staff-captains, 133 are staff-commanders, navigating lieutenants and sub-lieutenants; of the last named there are but three.

¹ See Navy List.

b. Officers of the Marines.

These are recruited like the officers of the army and are subject, on the whole, to the same regulations; the uniform too, barring a few distinctive badges, is the same.

Candidates for the ARTILLERY, who must be between 16 and 18 years of age, have to pass a competitive examination at the Military Academy at Woolwich; those who pass are appointed Second Lieutenants and are sent on to the Naval College at Greenwich for a nine months' course, at the end of which they have to pass an examination; then they go through a practical course in gunnery and the use of torpedoes in the "Excellent" and the "Vernon" at Portsmouth, whence they proceed as lieutenants to do garrison duty at Southsea near Portsmouth till the time of their embarkation.

Candidates for the INFANTRY have to pass through the same examination as those for artillery, but at the age of between 17 and 19, or even older; the course at Greenwich lasts 9 to 11 months, that on the training ship is omitted. Having passed the examination, they join their corps as lieutenants and go into garrison either at Portsmouth, Plymouth or Chatham.

PROMOTION in both branches of this service is by SENIORITY from the lieutenant upwards to the Colonel-Commandant and General. Service is partly on board, where the marines constitute a part of the regular crew, and partly on shore both at home and abroad in accordance with their motto "Per mare, per terram". As land troops they find frequent employment in the numerous small wars the country has to wage, at present principally in Africa.

The Marine Artillery employs: 1 General, 2 Lieutenant-Generals, 1 Major-General, 2 Colonels, 4 Lieutenant-Colonels, 14 Majors, 35 Captains, 19 Lieutenants and 15 Second-Lieutenants; in all 93 Artillery Officers. The Infantry employs: 2 Generals, 3 Lieutenant-Generals, 5 Major-Generals, 9 Colonels, 13 Lieutenant-Colonels, 42 Majors, 76 Captains, 114 Lieutenants, and 22 Second-Lieutenants; in all 284 Infantry Officers, making a total of 377 Officers of the Marines. Officers of higher rank than Majors¹ no longer serve on board ship, and the Majors themselves are employed only on Flag ships. On board, the Marines are, irrespective of their rank, subordinated in every respect to the officer in command and to the officer second-

¹ Though exceptionally as "Brevet Lieutenant-Colonel." The translator.

in-command of the ship. They must never assume command of a ship or boat, except upon express orders; but they are in command of their own troops on board, in everything that concerns their particular service.

Full Pay Royal Marine Officers.¹

Rank	Artillery		Infantry	
	Year of 365 days	One day	Year of 365 days	One day
Colonel Commandant	£730 0 0	£2 0 0	£702 12 6	£1 18 6
Colonel Second Commandant	£479 1 3	£1 6 3	£365 0 0	£1 0 0
Lieutenant Colonel	£328 10 0	£0 18 0	£328 10 0	£0 18 0
Major after 2 years' service	£292 0 0	£0 16 0	£292 16 0	£0 16 0
Major under 2 years' service	£257 0 5	£0 14 1	£247 17 11	£0 13 7
Captains having Brevet rank	£257 0 5	£0 14 1	£247 17 11	£0 13 7
Captains	£220 10 5	£0 12 1	£211 7 11	£0 11 7
Lieutenant after 10 years' service	£142 19 2	£0 7 10	£136 7 6	£0 7 6
Lieutenant after 3 years' service	£124 14 2	£0 6 10	£118 12 6	£0 6 6
Lieutenant under 3 years' service	£101 17 11	£0 5 7	£95 16 3	£0 5 3
Second Lieutenant	£95 16 3	£0 5 3	£95 16 3	£0 5 3

Half Pay Royal Marine Officers.

Colonels	£300 0 0	£300 0 0
Lieutenant Colonels after 5 years' service, who are qualified for retired pay	£450 0 0	£450 0 0
Other Lieutenant Colonels	£212 18 4	£200 15 0
Majors	£182 10 0	£173 7 6
Captains ²	£133 16 8	£127 15 0
Lieutenant after 10 years' service	£85 3 4	£82 2 6
Lieutenant after 3 years' service	£76 0 10	£73 0 0
Lieutenant under 3 years' service	£57 15 10	£54 15 0

The LIMIT OF AGE for compulsory retirement from the service is for Generals 65 years, for colonels 60 years, for lieutenant-colonels 54 years, for majors 48 years, for captains 42 years. All these officers receive pensions ranging from £750 to £225 (see Navy List).

Special pensions are paid and regulations made for optional retirement after 12 to 30 years' service, for which the reader is referred to the Navy List. In some cases officers receive considerable gra-

¹ For further and more detailed information see Navy List.

² Captains with Brevet rank having served 7 years as Captain R. M. A. £152 1 8, R. M. L. I. £146 0 0. The translator.

tuities, or may, with the consent of the Admiralty, commute their pensions; this commutation sum amounts sometimes to nearly £2450. 0. 0.

c. Engineers.

The decided aversion of English naval officers to innovations of every kind led to a tardy adoption of steam as motive power for ships. Naval officers of the old stamp had a rooted dislike to machinery and all that pertains to it, which had an adverse effect on the introduction of machinery in the navy, and on the formation of the corps of Naval Engineers; and although in 1842 the navy already possessed 29 steamers with engines up to 320 nom. H. P., yet the leading engineer held only the rank of a warrant officer lower than the carpenter. The NUMBER of engineers also was small and for the exigencies of war quite inadequate. In the stress of the Crimean war they were forced to engage whatever men they could get and at high pay; the chief engineer of a gunboat receiving £16 a month.

From that time forward steamers only were considered useful in war, and engineers were engaged in great numbers. In 1863 steamers had no machinery on board except the engines and even these were used as little as possible, sails being preferred; but for all that there were employed in the navy no less than 1356 engineers; for example the frigate "Inconstant", had as many as ten engineers on her staff, and so on with other ships. In the same year the training of engineers was regulated much on the lines followed to this day.

In the years of peace that followed, the old discarded practices were again reverted to; in 1868 "Engine-Room Artificers" were introduced for the manipulation and repair of the engines and the number of engineers was rapidly reduced; in 1889/90 their number had sunk to 642, that of the engine-room-artificers having risen to 1289. At present the number of engineers on board is very small, too small indeed, considering that their sphere of work, the number of their multifarious duties and their consequent importance has enormously risen during the last 25 years. Ships are no longer propelled by sails, and depend for their motion wholly upon the engines; the number of steamers is very much greater, and many ships carry small torpedo-boats; the ship is steered, loads are moved on board, and bilge pumps are worked by machinery. Mechanical contrivances are similarly required for generating light for the ship and for search-

lights, for turning the armoured turrets, and often also for hoisting the ammunition. So largely has the introduction of machinery increased, that some ships have more than one hundred different machines in use, and at the same time the complicated structure of modern vessels has greatly added to the responsibilities of engineers.

In the present day the HEAD ENGINEER of a ship is in charge of:

1. the engines and boilers;
2. the engines and boilers of tenders and torpedo boats;
3. all auxiliary engines, whose number sometimes exceeds 100;
4. all the pumps, inclusive of the extensive and complex pipe connections;
5. the distilleries (for the preparation of drinking water);
6. the turning gear for armoured turrets, guns and gun-carriages, as well as the mechanism (hydraulic) for working the guns, hoisting the ammunition &c.;
7. the torpedoes with their engines, and the mechanism for using and discharging them, as well as the air-compressors and appurtenances;
8. the ventilation arrangements;
9. the capstans;
10. the steam steering-gear;
11. the steam-winchcs;
12. the steam fire-engines with hose and appurtenances;
13. the hydraulic lifting gear;
14. the engine-room telegraph;
15. the ash-hoists;
16. the engines for generating electric lights for the ship, search-lights and signals;
17. the ice-machines;
18. all the contrivances for flooding any part of the ship in fire-emergencies, e. g.: the magazines;
19. the double bottom and all other portions of the ship, which are more or less difficult of access and in danger of rust;
20. all the watertight doors and fastenings of every kind.

To these have yet to be added the spare gear for the different engines, the tools, the store of coals, the lubricating substances and finally the superintendence of the attendants on the several engines, the number of which sometimes exceeds one hundred.

From this it is evident that the performance of a ship in almost . . every direction, as well as the use of the armament, and the internal

comfort, depend wholly or in part on the head engineer; the extent of his labours and of his numerous, manysided, and grave responsibilities are well nigh overwhelming. To be able to do justice to himself and to his work he needs to be supported by a numerous and efficient staff, and to hold pecuniarily and socially a position commensurate with the importance of his work. This is what naval officers do not yet understand; they are still victims of the old aversion to mechanical engineers (engine drivers as they used to call them) and it will want the lessons of a war to open their eyes.¹

The EDUCATION of engineers however has been planned on right lines over since 1863, and it is even now being steadily improved, the practical and scientific qualifications demanded of an engineer being very high.

Engineers are RECRUITED much in the same way as the corps of naval officers; the candidate does not pass through the earlier stages on board ship, but enters his practical duties at once as assistant engineer; this post is gained by open COMPETITIVE examinations, which are held yearly and simultaneously in different large centres in Great Britain, the Admiralty reserving to itself the right to nominate a few candidates whilst three are reserved for the colonies. Although the engineers are not without grievances yet there is no lack of applicants. These must be between 14 and 17 years of age and free from bodily defects.

The ENTRANCE EXAMINATION is very similar to that of naval cadets, but in the Mathematics, Physics and Chemistry the demands are somewhat higher; they include Arithmetic, the elements of Geometry and Algebra, of Physics and Chemistry, English Composition &c.; also French, German or Italian, Geography and free hand drawing. Candidates being admitted irrespective of their family connections and social position their status at the officers' mess and in other respects is not enviable. The examinees who pass are admitted into the navy as ENGINEER STUDENTS and are sent on the 1st of July to the Royal Engineers' College at Keyham, which is part of the Devonport Dockyard. There they live and are provided with spacious playgrounds and boats of various kinds; their courses of study, which are under the supervision of the Admiral Superintendent, last five years,

¹ Our author is somewhat too pessimistic in this case; the naval officers were loud in the praise of the heroism of the engine-room staff in the ill-fated "Victoria." The translator.

with six weeks' vacations each year. The friends of the student have to defray the expenses of his uniform and other outfit, as well as his current expenses such as washing &c. and they pay £40 a year; out of this the lads receive a small allowance for pocket-money, beginning with 1/- a week, and rising gradually to 5/- and finally 8/- a week.

The EDUCATION is pre-eminently PRACTICAL; the first three years are spent in the machine shops of the Dockyard, in the construction of gun, torpedo, and electric lighting machinery; the fourth year is devoted to boiler construction, building of iron ships, castings, copper-smith work, and model making; of the fifth year six months are spent on board ship in making repairs, and six months in the Drawing Office. In every workshop the student is required to produce a test article of his own making. The instruction in building of iron ships is given by the Chief Constructor of the Dockyard. In addition to all this, THEORETICAL teaching is given in the schools on two mornings and three evenings in each week; like the practical teaching it comprises all branches of engineering, viz: engines, boilers, auxiliary machinery, electric and hydraulic apparatus, torpedoes &c. Every year an examination is held at Greenwich under the superintendence of the President of the Naval College there; it covers Mathematics, Physics, Chemistry, History and Geography, French, Statics and Hydrostatics; in the second and subsequent years practical skill in the manipulation of machinery is also tested. The LEAVING EXAMINATION at the end of the fifth year is conducted by mechanical engineers of the steam-reserve in the Dockyard, and is on the manipulation of engines; that on practical work is conducted by the Chief Engineer of the Dockyard, and on the other branches by the Director of Studies. In the theoretical studies the following subjects are optional. The Differential and Integral Calculus, Mechanics, Thermo-dynamics, Metallurgy, and Construction of Machinery. It is clear from this enumeration that the course of studies is very comprehensive. The EXAMINATION CERTIFICATES are of three grades, and according to these the school years count as twelve, six, or three months' service. A student who fails in the examination is dismissed.

Those who pass are appointed as "Probationary Assistant Engineers" in the Steam-Reserve in the dockyard, and are employed on board; and if after a twelve months' trial they have given satisfaction they receive their final appointment as "Assistant Engineers." The best

of the successful examinees, that is to say, those who have earned 60% of the marks obtainable, are sent on the 1st of October to the Naval College at Greenwich, to continue their theoretical studies in a further course of nine months' duration.

From the examination lists on this last course the two best men are chosen to go through two more theoretical courses so as to become Naval Constructors. Then they have to undergo one year's sea-service, and are eligible for an appointment at the Admiralty. Those who at the difficult final examination at Greenwich have earned a certificate of first or second grade are received in the CORPS OF NAVAL CONSTRUCTORS, as Assistant Constructors of the Third Class. This rank they hold for four years and are eventually employed in the dockyards abroad; if they conduct themselves well and discharge their duties satisfactorily they are in due time promoted and become Assistant Constructors of the Second Class, and ultimately by selection of the First Class. Those who at the final examination at Greenwich have earned a certificate of the first grade may arrive at this last post by the end of the fifth year.

Candidates may adopt this career by entering the Naval College at Keyham direct; but the standard for these is considerably higher; at the final examination after the five years of study Conics, higher Mathematics and applied Mechanics are OBLIGATORY, great stress being laid on PRACTICAL naval construction in all its branches, in the drawing-office, in the workshop, in the moulding loft and in the practice on the blocks. Those who pass well may also go for three years to the Naval College at Greenwich. They are then admitted into the Corps of Naval Constructors only on condition that they pass well the Greenwich Examinations. After that they are subject to the same regulations as the other students.

There is another road of admission into the Corps of Mechanical Engineers even without attending the School for Naval Engineers at Keyham. Candidates between 20 and 23 years of age of good conduct, who have studied with success at one of the higher technical colleges may be appointed as PROBATIONARY ASSISTANT ENGINEERS, if they pass a special examination at Greenwich, in which Statics, Hydrostatics, Hydraulics, Pneumatics, and Dynamics are obligatory; higher Mathematics and Machine-Construction are optional subjects; if they gain a certificate of the first class they may be admitted to the further course at the Naval College at Greenwich on the same conditions as apply to the other students at Keyham.

Even without the above mentioned examinations, candidates may be appointed, if they possess good certificates from some technical college and pass successfully an easy practical examination, but then their certificate is only of the Third Class; this excludes them from the Naval College at Greenwich but leads to an immediate appointment to practical work with the rank of Probationary Assistant Engineer. Moreover the Admiralty has reserved to itself the TEMPORARY appointment of *junior* civil engineers possessed of the necessary practical and theoretical attainments as Assistant-Engineers, who may at any time, when their services are no longer required, be discharged with a compensation payment of six months' salary.

When the assistant-engineer has served three years he may apply to be examined for the post of ENGINEER. The examination may take place at home or abroad; it is conducted by two or three mechanical engineers of high rank in presence of the superintendent of the dock-yard reserve, or of the Captain of the ship, as the case may be. The examinee must be fully able to discharge the duties of an engineer and have such mastery of the mechanism of the engines, that he can deal even with special occurrences and be fit to undertake the sole charge of an engine. The appointment of engineer can only be bestowed upon an assistant-engineer after five years' service, and then he is employed as officer of the watch on large ships, or as engineer in charge on small ships.

To gain the next step of promotion, viz: that of CHIEF ENGINEER there is required: 1. at least a three years' service as Engineer in charge on a sea going ship-of-war; 2. the passing of one more examination before a board constituted like that just described. This examination is to prove intimate acquaintance with all the different kinds of ship's engines and boilers; and with the calculations of their capacity of performance; also skill in drawing portions of engines, working drawings, and ability to discharge all the functions of superintending engineer. The certificates awarded are as usual of three grades. The appointment of chief engineer however can only be gained by those who have earned a certificate of the Naval College at Greenwich, unless special exemption is granted by the Admiralty.

This concludes the series of examinations for members of the corps of naval engineers. It will be seen, that nobody can enter the higher ranks, who has not passed the final Examination at Keyham at least "*well*" and has moreover gone through at least one higher scientific course at Greenwich.

The next step of promotion, that of STAFF-ENGINEER requires four years' service as chief-engineer and nothing else, and to become FLEET-ENGINEER there are needed eight years' service either as staff-engineer or as chief-engineer. Holders of these rank are employed as superintending engineers upon ships, the fleet-engineers being engaged on the largest vessels and on flag-ships.

Up to this point PROMOTION goes by SENIORITY, provided that all the conditions above described are fulfilled, the next advance, viz: to the post of INSPECTOR OF MACHINERY follows upon selection; but only such officers are eligible, as have held posts of at least chief-engineer for a minimum period of five years, inclusive of two years' service as superintending engineer. Promotion to the highest post of all, viz: that of CHIEF-INSPECTOR OF MACHINERY is again awarded by seniority; the only qualification being a long and meritorious time of service. The inspectors and chief-inspectors of machinery are employed as directors of engine works in the dockyards both at home and abroad, and also in the fleet- and dockyard reserves.

It is seen then that naval engineers are taken through such a wide range of studies, both theoretical and practical, with standards of attainments so high in each, that only men of close application and strenuous endeavour can hope to succeed. These qualities English engineers possess in an eminent degree, although their status, compared with that of other branches of the naval service, leaves much to be desired. Their promotion is slow and their pay is comparatively low. The assistant engineer has to remain about 4 years in that post; the engineer at least seven years in his; it thus requires seventeen years at least, counted from the day of entry, before the post of chief-engineer is reached. Both this latter officer and the staff-engineer have to remain in their respective ranks four years and the fleet-engineer eight years. It takes then about 33 years of service to rise to the rank of inspector of machinery.

On the 1st of October 1896 the navy employed five chief inspectors of machinery, one of these and he NOT the eldest, was the Engineer-in-Chief of the whole navy and Head of the Engineering Department of the Admiralty; eight inspectors of machinery, 121 fleet-engineers, 78 staff-engineers, 79 chief-engineers, 298 engineers, and 216 assistant-engineers, making a total of 805 members of the corps of engineers; 67 of these or 8·3 % of the whole number, which are distributed amongst *all* the ranks, have gone through the special course of naval architecture at Greenwich. One of these is the En-

gineer-in-Chief, the Adviser to the Admiralty. In addition to all these there were employed 35 assistant-engineers holding temporary appointments.

Table of full pay and half pay of the naval Engineers.

Rank	Full Pay		Half Pay	
	Year of 365 days	One day	Year of 365 days	One day
Chief Inspector of Machinery .	£730 0 0	£2 0 0	£438	£1 4 0
Inspector of Machinery .	£638 15 0	£1 15 0	£401 10	£1 2 0
Fleet, Staff & Chief Engineers .	£255 10 0	£0 14 0	£127 15	£0 7 0
rising for every 2 years' service at first by £18 5. a year and afterwards by £36. 10. 0. a year up to	£474 10 0	£1 6 0	£328 10	£0 18 0
Engineers	£164 5 0	£0 9 0	1	—
rising every 3 years by £18. 5. 0. till after 9 years the maximum is reached of	£219 0 0	£0 12 0	£109 10	£0 6 0
Assistant-Engineers	£109 10 0	£0 6 0	—	—
Ditto. After 1 years' confirmed service	£136 17 6	£0 7 6	—	—
Probationary Assistant Engineers on entry ¹	£109 10 0	£0 6 0	—	—

The head engineers receive *additional allowances*, which vary, according to the class of the ship and the regulations of the Admiralty, from £18. 5. 0. to £164. 5. 0. a year; those on flag-ships receive a further augmentation of from £45. 12. 6. to £91. 5. 0.; senior engineers doing duty on a ship with engines of 3000 H.P. or more have a still further increase of £36. 10. 0. a year; the head engineers on ships of the fleet- and dockyard reserves draw half this amount, and the corresponding inspectors and chief-inspectors of machinery draw £54. 15. 0. a year besides.

The Retired Pay of engineers varies according to age, years of service, and rank from about £50 a year for assistant engineers to £550 a year for Chief-inspectors of machinery. Engineers² and assistant-engineers retire compulsorily at 40 and 45 respectively; chief-, staff-

¹ Subsequently £136. 17. 6. a year = 7/6 a day, subject to special regulations; see Navy List.

² See Navy List.

and fleet-engineers retire optionally at 50, compulsorily at 55; inspectors and chief-inspectors of machinery optionally at 55, compulsorily at 60.

d. Surgeons.

The Medical Service in the English navy had been for a long time in a sad state, in consequence of which a mortality truly appalling occurred from time to time. In Cromwell's time Admiral Blake succeeded in effecting a temporary amelioration, but after him surgeons' posts were again obtained by purchase and remained so in spite of the appointment of a *Surgeon General* of the Navy in 1664. Medicines and drugs were bought by the surgeon or the paymaster, presumably not without some commission for themselves, and the regulation of 1703 that all medicines, drugs, instruments &c. should be officially inspected in London before being received on board, caused great indignation. Down to the present century surgeons held a very subordinate position in the service; not till 1808 were they ranked *higher* than the warrant officers and *put on a level* with the master and paymaster. At present their status is that of Higher Officials.

The career of a naval surgeon is open to every native born Englishman, who has gained the necessary qualifications for the post in accordance with the official regulations. He must be of PURE EUROPEAN BLOOD, between 21 and 28 years of age, and free from bodily defect. He must produce certificates of good conduct and morals, and be willing to do service in all quarters of the globe. Candidates are inspected at the Admiralty, and have to pass a COMPETITIVE EXAMINATION in which Medicine, Surgery, Anatomy, Physiology, the elements of Chemistry, and Materia Medica, are obligatory, and Biology, Physics, Physical Geography, French and German are optional. Those who pass are appointed at once as naval surgeons with a salary of £209. 17. 6. a year (11/6 a day); the status in the service depends on the result of the examination. Next they have to pass through a course of instruction on the practice of hygiene on board ship, given at the great hospital at Haslar near Portsmouth. Afterwards on the recommendation of the Medical Director General of the Navy, they are employed in the service either on large ships as assistants of the senior medical officer, or even as ship's surgeons in smaller vessels, if they are somewhat older men; or on shore in naval hospitals or dockyards both at home and abroad.

After twelve years' active service, during which time his salary has

risen to £282. 17. 6. a year (15/6 a day), he is promoted and becomes staff surgeon with a salary of £383. 5. 0. a year (£1. 1. 0. a day); every year one and only one medical officer may, on account of eminent services, be exceptionally promoted by the Admiralty after a shorter number of years of service, provided always that there should never be more than eight officers so promoted in the corps of naval surgeons. The staff surgeons are employed as senior medical officers on ships of all sizes.

The senior medical officer or the SHIP'S SURGEON must visit the patients on board at least twice a day, and has to look after the health of the crew and the sanitary condition of the vessel and eventually to make suggestions to the Commanding Officer concerning drinking water, the diet of the men, ventilation &c.

Every man, who enters the service for the first time he examines medically, re-vaccinates him, and enters on a special register the changes, if any, in the man's state of health as they occur; this register is bound to be preserved among the personal papers of the man. In addition to the register of his patients the surgeon has to keep an accurate diary, recording the sanitary condition of the ports visited, the diseases prevalent in them, and their mode of treatment, also the medicines or other non-official restoratives used, their effectiveness, preparation and mode of employment, and to make minute and accurate reports thereon.

After twenty years' active service and upon the recommendation of the Medical Director General of the staff, the surgeon is promoted to the rank of fleet surgeon. In this case also an earlier promotion is permitted, but only once every other year and with the limitation that no more than six officers so promoted should exist in the whole corps. Fleet surgeons render medical service on the largest ships and on flagships and medical officers of higher rank are not employed on board ship at all.

From the body of fleet surgeons are selected according to capacity and merit the DEPUTY-INSPECTORS GENERAL OF HOSPITALS AND FLEETS. These do duty on shore as surgeons of stations and superintendents of hospitals; as a rule they serve first three years abroad and afterwards at home. Service of three years abroad or of five years at home is the condition for promotion to the highest post, that of INSPECTOR GENERAL OF HOSPITALS AND FLEETS, of whom there are only two in existence; these are the heads of the naval hospitals at Haslar and Portsmouth.

There are 12 deputy inspectors general of hospitals and fleets, 52 fleet surgeons, 111 staff surgeons, 232 surgeons, making, inclusive of the Medical Director general of the navy, a total of 410 Surgeons of the Navy.

Table of full pay and half pay of naval Surgeons.

Rank	Full Pay		Half Pay	
	Year of 365 days	One day	Year of 365 days	One day
Inspector General	£1003 15 0	£2 15 0	£693 10 0	£1 18 0
Deputy Inspector General .	£766 10 0	£2 2 0	—	—
ditto On promotion . .	—	—	£456 5 0	£1 5 0
After 2 years' full pay service in rank	—	—	£492 15 0	£1 7 0
After 4 years' ditto . . .	—	—	£529 5 0	£1 9 0
Fleet Surgeon:				
On promotion	£492 15 0	£1 7 0	£310 5 0	£0 17 0
After 2 years' full pay service in rank	—	—	£328 10 0	£0 18 0
After 4 years' full pay service in rank	£547 10 0	£1 10 0	£346 15 0	£0 19 0
After 6 years' full pay service in rank	—	—	£365 0 0	£1 0 0
After 8 years' full pay service in rank	£602 5 0	£1 13 0	—	—
Staff Surgeon:				
On promotion	£383 5 0	£1 1 0	£219 0 0	£0 12 0
After 4 years' full pay service in rank	£438 0 0	£1 4 0	—	—
After 2 years' full pay service in rank	—	—	£237 5 0	£0 13 0
After 4 years' full pay service in rank	—	—	£255 10 0	£0 14 0
After 6 years' full pay service in rank	—	—	£273 15 0	£0 15 0
Surgeons:				
On Entry	£209 17 6	£0 11 6	—	—
Under 2 years' full pay service .	—	—	£109 10 0	£0 6 0
After 2 years' full pay service .	—	—	£127 15 0	£0 7 0
After 4 years' full pay service .	£246 7 6	£0 13 6	£146 0 0	£0 8 0
After 6 years' full pay service .	—	—	£164 5 0	£0 9 0
After 8 years' full pay service .	£282 17 6	£0 15 6	£182 10 0	£0 10 0
After 10 years' full pay service .	—	—	£200 15 0	£0 11 0

The senior medical officer (being a fleet or staff surgeon) of a flag ship bearing the flag of a Commander-in-Chief on a foreign station is allowed 5/- a day in addition to full pay. The senior medical officer (being a fleet or staff surgeon) of the ship of a commodore or a senior officer commanding a foreign station, is allowed 2/6 a day in addition to full pay.

Retired Pay and Gratuities—Medical Officers.

Rank	Gratuities	Year of 365 days	One day
Surgeon and Staff Surgeon:			
After 8 years' full pay service	£1000 0 0	—	—
After 12 years' full pay service	£1500 0 0	—	—
After 16 years' full pay service	£2250 0 0	—	—
Fleet Surgeon:			
After 20 years' service (including proportion of half pay time)	—	£365 0 0	£1 0 0 ¹
After 24 years' service (including proportion of half pay time)	—	£410 12 6	£1 2 6 ¹
After 27 years' service (including proportion of half pay time)	—	£456 5 0	£1 5 0 ¹
After 30 years' service (including proportion of half pay time)	—	£547 10 0	£1 10 0 ²
Deputy Inspector General	—	£638 15 0	£1 15 0
Inspector General	—	£730 0 0	£2 0 0

Incapacity for service, contracted in service of less than 20 years, gives title to half-pay.

Surgeons in receipt of full pay are not allowed to accept fees of any kind for service rendered.

e. Naval Chaplains.

In remote times it has been customary in the English navy to conduct prayer twice a day, and to sing a hymn or a psalm on relieving guard; nevertheless it was not till 1626 that orders were issued that a clergyman should be on board of every ship, and even then these orders were not always rigorously adhered to. Many a

¹ To obtain this rate an officer must hold the commission of fleet surgeon.

² Or on compulsory retirement at the age of 55.

commander of a vessel found it inconvenient, that the clergyman on board should keep a diary by which the occurrences during the voyage might become known to undesirable third parties. The position of a clergyman on board was also for a long time an unenviable one; he as well as the surgeon were paid out of deductions made from the men's wages, and during a combat they had their place in the cockpit with the wounded. Subsequently when an officers' mess was introduced (for the lieutenants) the clergyman very often was not admitted. Take it as you may, the position of a clergyman on board is not an easy one; and with the coarseness of those bygone days it was specially difficult; those gentlemen moreover may possibly not have always conducted themselves with the propriety due to their cloth; still, on the whole, their influence has been highly beneficial and many a one has distinguished himself during combat and in times of danger.

The SERVICE of the clergy was as early as the end of the 17th century similar to that of the present day. He preached every morning on the quarter-deck, conducted prayer in the afternoon and moreover taught the cadets and midshipmen, and he watched over the literature introduced on board. It was not till the present century that the status of the clergyman on board, who very often is also naval instructor, has been suitably regulated.

Any one desirous of being appointed naval chaplain must have been ordained as deacon or priest in the Church of England, and must bring certificates from the bishop of his diocese; or he must have been duly and lawfully appointed preacher in a church allied to the Church of England. He must not be more than 35 years of age and must not be the holder of a benefice; moreover he must be sound in body, fitted for his office, and ready and willing to proceed to any part of the world he may be sent to, and also to do duty ashore on foreign stations.

Having passed the examination prescribed by the Admiralty he is appointed NAVAL CHAPLAIN with a salary of £219. 0. 0. a year (12/- a day); after 5 years' service this is raised to £237. 5. 0. (13/- a day), then successively every three years the salary rises by 1/- a day, till after 20 years' service it has risen to 18/- a day (£328. 10. 0. a year); from now forward the rise of 1/- a day takes place yearly, till after 24 years' service the highest amount is reached, viz: £401. 10. 0. a year (£1. 2. 0. a day). A chaplain does not hold any military rank, but he has a marine allotted to him as his personal servant. He

has no clerical superior over him, but the chaplain of the fleet exercises some slight supervision.

The DUTIES OF HIS SERVICE require him to conduct prayer every morning after the crew are mustered and to hold Divine Service every Sunday, using the Liturgy of the Church of England, the naval schoolmaster playing the harmonium, and the choir, formed from among the crew, singing the hymns &c. He is to administer the Sacrament as regularly as possible once a month, all those participating, who desire to do so; in this, as in every other respect, he may rely on the support of the commanding officer, whose duty it is, so to arrange the service of the chaplain, that he should not be exposed to any derogation from the respect due to him. The chaplain gives religious instruction to all the boys on board and at the wish of the commanding officer also to the naval cadets, excepting always those belonging to other religious communities; he holds special prayer-meetings for those who desire it—in short he has the care of the souls of his congregation, which is the whole crew, and he is to be the FRIEND AND COUNSELLOR of all. For that purpose he has an eye on the literature of the ship and may make proposals on that score to the commanding officer, and he may apply for twenty shillings for every 100 men under his charge for the purchase of good books. He is to pay daily visits to the patients in the hospital, and give them spiritual comfort; in port he is to visit also the patients of other ships that have no chaplain, and those of his own ship in the hospitals on shore. At their death he is to be present at the funeral.

In this and in all similar ways, but above all by his own *example* the chaplain can overcome the great difficulties of his position on board and can exercise a most beneficent influence; especially if he is supported by the authority of the commanding officer and of the officer second in command.

The most senior Naval Chaplains are no longer employed on board, but on shore, in the dockyards, in the naval stations, in the hospitals at home and abroad, the head quarters of the Marines &c. Of the 102 naval chaplains at present employed, the senior is the chaplain of the fleet, 45 are also naval instructors, and 79 are on board ship.

The PAY of the chaplain has already been indicated; if he combines with his office that of naval instructor his pay is raised 50%; accordingly it begins with £328. 10. 0. a year (18/- a day), and rises in proportion by identical steps as those stated above p. 146 till it

reaches the maximum of £602. 5. 0. (£1. 13. 0. a day). His half-pay amounts after 3 to 5 years' service to £109. 10. 0. (6/- a day), rises then every 3 years by £18. 5. 0. a year (1/- a day), but after 14 years' service by £27. 7. 6. a year (1/6 a day), from 20 years to 25 years by £36. 10. 0. (2/- a day), up to the maximum of £292 (16/- a day), half-pay is also largely increased for a chaplain who also does duty as naval instructor.

RETIREMENT is compulsory at the age of 60, optional at 55, and moreover retirement is always conceded after 5 years' service, if the chaplain is to accept a living as a country-parson. Retired pay however is only given after 10 years' service, viz: £50 a year; after 15 years' service £100 a year, and after 20 years' service £150 a year.

Finally there is yet to be mentioned that at the two largest naval ports at home, at Portsmouth and Devonport, a Roman Catholic clergyman is employed in each for the benefit of the members of that church.

f. Naval Instructors.

This class of officials was introduced in 1837 for the purpose of making better provision for the education of the cadets and midshipmen on board. To raise the status of the instructor and to maintain discipline all the more easily a comparatively high military rank has been bestowed on him; he starts with the rank equal to that of a naval lieutenant under 8 years' seniority, or of a captain in the army; after 8 to 15 years' service he ranks with a naval lieutenant over 8 years' seniority, or of a major in the army, after more than 15 years' service he is the equal of a commander in the navy or of a lieutenant colonel in the army (see Table of Relative Rank p. 112).

ON ENTERING THE SERVICE he must be between 20 and 35 years of age, be bodily fit for the work, and pass a preliminary examination in Lower Mathematics, Elementary Statics &c. and also in Latin, but this is more or less omitted in the case of University-men. Then he receives his appointment and has to go through a special six months' course at the Naval College at Greenwich; but this may be shortened in the case of those who have had a thorough education. During this time he has free quarters at the College and receives 7/6 a day. The Examination following thereupon comprises Navigation, Nautical Astronomy and Surveying, Meteorology, Physics, the use of Instruments, and Acquaintance with the Mechanism of Steam Engines;

to these are yet to be added as optional subjects: Chemistry, Drawing and Foreign Languages. When he has passed the examination he is appointed to a ship.

There it is his duty to instruct the cadets and midshipmen and prepare them in their scientific studies for the officers' examination; he must always be present, when they make astronomical observations and must superintend their calculations thereon; he has also to see that they keep their various diaries and log-books and must inspect these every week. He is responsible for the good conduct of his pupils during school-time and has to keep a register of them; this he submits once a month to the commanding officer and reports to him those who are indolent or ill-disposed. If there is no chaplain on board he has also to manage the school for the seamen-boys.

There are in all 79 naval instructors, all but eleven of whom are employed on board-ship. More than half, viz: 48 are also chaplains, as has already been said.

Table of full pay and half pay of Chaplains¹ and Naval-Instructors.

	Full Pay		Half Pay	
	Year of 365 days	One day	Year of 365 days	One day
Under 5 years' Service	£219 0 0	£0 12 0	£109 10 0	£0 6 0
After 5 " "	£237 5 0	£0 13 0	£127 15 0	£0 7 0
" 8 " "	£255 10 0	£0 14 0	£146 0 0	£0 8 0
" 11 " "	£273 15 0	£0 15 0	£164 5 0	£0 9 0
" 14 " "	£292 0 0	£0 16 0	£191 12 6	£0 10 6
" 17 " "	£310 5 0	£0 17 0	£219 0 0	£0 12 0
" 20 " "	£328 10 0	£0 18 0	£255 10 0	£0 14 0
" 21 " "	£346 15 0	£0 19 0	—	—
" 22 " "	£365 0 0	£1 0 0	—	—
" 23 " "	£383 5 0	£1 1 0	—	—
" 24 " "	£401 10 0	£1 2 0	—	—
" 25 " "	Maxm.		£292 0 0	£0 16 0

In addition to his pay the Naval Instructor draws a yearly FEE of £5 for every pupil and his daily rations, or in lieu of them 1/6 a day. . .

Surgeons, chaplains, and naval instructors enter the navy, when they are already grown up, having received their education on shore, mostly at some University; we have yet to describe one branch of the service, whose members must enter in EARLY YOUTH.

¹ See Navy List.

g. Accountant Officers.

Accountant officers or paymasters belong to the oldest officials of the Navy; as far back as the 14th century, when they were called "*Pursers*" they had to administer the distribution of small stores and victuals; sometimes they even contracted for the victualling of the crew. Like the warrant officers and the cooks the pursers formed part of the permanent officials of the navy, who were appointed by the Admiralty; upon ships of the Reserve they mounted guard jointly with the boatswain and the carpenter; but their social status was higher; commonly they were men of means or had friends possessed of means. The position of the purser exposed him to many temptations, for, although he did not in the last century pay wages and salaries to the crew, this being commonly done by special officials in London, when the ship was paid off, still he had to make many payments on the ship's account and came in contact in all parts with contractors, who were wont to pay him per-centages. This speedily led to abuses, till they became glaring in the time of the Stuarts, when the purser purchased his post at a high price. The lists of the ship's crews were kept incorrectly and so on; but the blame did not rest with the purser alone, for he had to share his gains with others, mainly with the officer in command, who was well aware of all his doings. Not uncommonly they were near kinsmen, or even brothers and made a common speculation of it. The moral standard was low, and the organisation of all control was very defective. It was only in 1813 that a regulation was made requiring paymasters to pass an examination after having belonged five years to the officers' mess along with the surgeons and masters.

The following are the regulations now in force for this career. Candidates between the ages of 16 and 18 must make application for admittance to the entrance examination to the Private Secretary of the First Lord of the Admiralty; they have to produce certificates of good conduct, must be in good health, free from bodily defects, and be able to swim. The entrance examination, which is of limited competition is held twice a year in London; the subjects are: Penmanship, Ciphering and Arithmetic, modern Geography, English History, Religious Knowledge and a little French. Those who pass are appointed Assistant Clerks and employed on board in the Paymaster's Office; they receive 2/6 a day, but their friends must pay £20 a year, in half yearly instalments. After a year a second examination is

held by three paymasters in presence of a commanding officer, in which the examinee must shew a fair knowledge of ship's book-keeping, vulgar fractions &c. If he passes he is appointed clerk by the officer in command. In this office he remains $1\frac{1}{2}$ years and receives 4/- a day; the paymaster gives him further instruction in the administration service, but as yet he does not hold a position of responsibility. At the age of 21 he has to pass the paymaster's examination, conducted like the previous one, on board, by three paymasters in presence of a commanding officer; the subjects are: Weights and Measures, Arbitration of Exchange and other financial operations, and the like. If he passes he is appointed ASSISTANT PAYMASTER by the senior officer on board; he is now a *responsible* official and, supervised by the paymaster, he administers the stores of clothing; on small vessels he may be employed as acting paymaster. His pay rises gradually from £91. 5. 0. a year (5/- a day) to £209. 17. 6. (11/6 a day).

Further PROMOTION is regulated not by rank, but solely by seniority. After six years the paymaster is promoted to the rank of staff paymaster, and after a further six years to that of fleet paymaster. Similarly with his pay, it rises in the course of 27 years from £255. 10. 0. (14/- a day) to £602. 5. 0. (£1. 13. 0. a day). A paymaster acting independently or a ship's paymaster draws an additional allowance of £45. 12. 6.

The ship's paymaster is responsible to the commanding officer for all the payments made, for the book-keeping and for the accuracy of accounts rendered; likewise for the victualling of the crew, for the administration of clothing and of the provisions; he is to supply the crew with postage stamps and postal orders &c. The library is under his charge, but the issue of the books is the business of the schoolmaster. The paymaster is at the head of the assistant-paymasters, clerks, and assistant-clerks of his branch, as well as of the writers, of the stewards and his mates assistants, of the cooper &c. From among the clerks the commanding officer selects one to conduct his correspondence, who accordingly ceases to be subordinate to the paymaster.

The post of the paymaster is both highly responsible and very laborious, seeing the wide range of his duties and the numerous reports, tabulated statements &c. he has to make. The most coveted post therefore is that of SECRETARY TO A FLAG-OFFICER,¹ an appoint-

¹ Which, though more pleasant, is generally more laborious. The translator.

ment conferred by the flag-officer, who is entitled to select his secretary for the whole time of his command from among the list of original paymasters. The duties of a secretary are far more pleasant and the pay begins with that of a commodore's secretary amounting to £273. 15. 0. a year (15/- a day) and rises after 14 years' service to that of secretary to a Commander-in-Chief, who draws £547. 10. 0. a year (£1. 10. 0. a day).

There are at present (18th March 1898), 82 Fleet paymasters, 61 Staff Paymasters, 72 Paymasters and 190 Assistant Paymasters; in all 405 officers, who are nearly all employed on board. There are moreover 93 paymasters on the retired list, who either receive retired pay or have commuted it. On retirement they received for their long and meritorious services the title of Paymaster-in-Chief.

An intermediate link between the above named commissioned officers and the crew are:

h. The Warrant-Officers.

These officers hold their posts not by "Commission" but by "Warrant," which is a diploma of lower rank, conferred by the Admiralty; this distinction however does not apply to the whole body of Warrant Officers, the holders of the highest ranks, viz: of "Chief Warrant Officers" being "commissioned" Officers.

The existence of warrant officers dates back to a time long anterior to that of naval officers, as no vessel can dispense with the services of a boatswain and of a carpenter, and no armed ship with those of a gunner. Accordingly these men together with the "purser" and the cook have at all times been "permanent" officials on board and their services were retained even after the ship had been paid off, as used to be done regularly every winter. They looked after the ship, kept her taut and trim, and mounted guard; they also administered the stores, and had with them on board a number of subordinates and assistants, who thus formed the *nucleus* of the crew. In 1731 this arrangement was officially recognized, and after 15 years the five grades of warrant-officers became entitled to a pension. At that time the "master" and the surgeon were also included among the warrant-officers, but the former office has since been abolished and the latter promoted to a higher rank. The *actual* warrant-officers then were and still are, in the order of their respective ranks, the gunner, the boatswain and the carpenter. They have always been

drawn from the "men before the mast," who were so called because their quarters were *before* the mainmast, the cabin and rooms of the officers abaft it. (For centuries, and down to the end of the Middle Ages, ships had only one mast.) The warrant officers are recruited from the most capable of the petty officers.

Candidates for these posts must produce good certificates for previous discharge of duty, capacity and good conduct; they must not be less than 21 nor more than 35 years of age, must have seen seven years' SEA-SERVICE, and at least one years' service as petty officers in the branch they aspire to. The CANDIDATE FOR THE RANK OF GUNNER must moreover be at 1st class seaman-gunner, and he has to pass an examination, conducted by an officer of the navigating branch, three chief warrant officers (two gunners and a boatswain), in presence of a superior officer. He must give proof of being a thoroughly experienced SEAMAN, who knows how to handle a ship and understands the action of the helm, knows the rule of the road at sea, is well acquainted with the rigging and capable of taking charge of the watch on board at sea, and knows how to stow the anchor and erect a derrick. Finally he must be able to write well, work sums in the four rules and manage the stores of his branch of service. His skill in gunnery he must prove by certificate from the gunnery training-ship.

The examination for BOATSWAIN, who must also be a seaman-gunner, is similar to that of the gunner, but the candidate is further examined in signalling by a signal-officer; in every other respect the composition of the examining-board is similar to that last described, only, if possible, there are to be present two boatswains and one chief-gunner. There is a class of boatswains called SIGNAL BOATSWAIN, who are expected to be acquainted with the manœuvres and organisation of squadrons, and with the signalling code of the army (to facilitate communications between the two services). At the examination for this latter post two senior naval officers experienced in signalling, and a signal-boatswain are to be added to the board of examiners.

A Candidate for the post of CARPENTER must besides the usual certificates furnish proof that he is a trained and able naval artificer, that he can make masts and yards, and repair those that are injured so as to be fit again for use, and generally be able to execute all carpenter's work required on board; moreover he must be able to write and cipher as described above. The board of examiners con-

sists of three chief-carpenters. The examination must be repeated in the dockyard, even if it has been passed satisfactorily on board.

Those who pass these examinations are entered on the lists and are promoted to the ranks of warrant officers as vacancies arise; they rank then higher than midshipmen and paymasters' clerks. They belong to a separate mess, that of warrant-officers, and do duty on board and also administer the stores of their section. PROMOTION to the rank of chief warrant-officer is by selection, by "Commission" of the Admiralty; they take rank with sub-lieutenants of the army and of the Marines.

Warrant-officers and chief warrant-officers, under 45 years of age may be promoted to the rank of Lieutenant, if they have distinguished themselves by excellent conduct and conspicuous gallantry.

The pay of warrant-officers amounts in the first 5 years to £100. 7. 6. (5/6 a day); after 5 years it rises to £127. 15. 0. (7/- a day); after 10 years to £146. 0. 0. (8/9 a day); after 15 years to £164. 5. 0. (9/- a day). Chief Warrant-Officers draw:

On promotion	£182. 10. 0.	(10/- a day),
after 2 years' service	£191. 12. 6.	(10/6 " "),
" 4 " "	£200. 15. 0.	(11/- " "),
" 6 " "	£209. 17. 6.	(11/6 " "),
" 8 " "	£219. 0. 0.	(12/- " ").

To these amounts are yet to be added £9. 2. 6. *additional allowance* for special duties by warrant-officers, who look after the stores of their department.

At present (18th March 1898) there are existing:

45 Chief-Gunners, 515 Gunners; together	. . 560
35 Chief-Boatswains, 401 Boatswains; together	436
18 Chief-Carpenters, 205 Carpenters; together	223
Total of Warrant-Officers	1219

The large majority of warrant-officers do duty on board; a small number, about 30 of the youngest gunners and carpenters, are on shore, and several of the chief-boatswains, mostly the older men, are engaged in the dockyards.

Of former chief warrant-officers who are no longer on active duty, 57 have been raised to the rank of honorary lieutenant.

The warrant-officers constitute a very important part of the *personnel* of the navy; being the executive of the officer in Command and of the gunnery-officers; they exercise great influence on the smooth and rapid working of the service, on the cleanliness and trimness of the

ship, on the efficiency of the guns, on orderliness of life on board &c. The careful management of the inventories and stores in their charge requires minute vigilance, and the discharge of their multifarious duties claims incessant attention and a keen and lively sense of responsibility. They may well be called the BACKBONE OF THE INNER SERVICE ON BOARD SHIP.

The warrant-officers of the English Navy have from of old been known as able men in their several spheres; but pre-eminently so as SKILFUL MARINERS.

Being recruited from the crews and rising to the rank of officers, they form the connecting link with the

CREW

which comprises Seamen, Engine-room Staff, Artificers, Cooks, and Domestic.

i. Seamen.

1. Historic Account.

In ancient times the crews of English ships—independent of cooks and domestics—consisted of sailors only; they were hardy men, born and bred on the sea, bold and audacious mariners, whose homes were on the English shores, mainly in the south and east coast; men who formed the kernel of the seamen of the “Cinque Ports.” These Ports were bound in case of need to place at the King’s disposal a number of ships with their complement of crews; this was the only compulsory military service in the country and the Conscription in use on the continent is regarded in England as a detestable and insufferable encroachment on individual liberty. Nevertheless, albeit not lawfully, as *a matter of fact* there has always been even in the Anglo-Saxon times an exception made in the case of mariners, *much to their disadvantage*. *Sailors have at all times been regarded as bound to serve in the Royal Navy*, and if they did not enter the service voluntarily, they were *forced* into it by the PRESS-GANG, often very ruthlessly and cruelly. In the Middle Ages even SHIPS were forcibly seized for the service of the King and the recalcitrant owner was hanged. The whole coast was divided into districts for that purpose and subjected to the Admiralty, so as to have all the Naval forces of the country at all times ready to execute the King’s commands.

When in subsequent times ships and their armaments had grown in

size, the rigging had become more complicated, and in the times of the Tudors the Royal Navy was enlarged, the crews also necessarily increased in number and size. Nevertheless the want of men was not painfully felt in the times of Elizabeth, notwithstanding the heavy requirements of the fleet that was fitted out to meet the Armada; but under her successor men were scarce although the navy was allowed to dwindle away; this was due partly to the rapid decline of maritime trade, but mainly to the fact that on account of the ill-treatment the men received on board, service in the Royal Navy was detested and dreaded. From that time forward, when war broke out, or when men were wanted for any other purpose, no reserve whatever existing, recourse was had to the press-gang, not unfrequently to a very large extent; even in the times of the Commonwealth (1649—60), when men received excellent treatment, the press-gang could not be dispensed with. The number of men required sometimes rose with great rapidity; thus between the years of 1653 and 1658 the numbers rose from 6,000 to 22,000; in 1688 they rose to 42,000 and remained at that figure for many years. Having declined after a long peace, they rose again in 1741 to 40,000 men, and in the Seven Years' War the numbers mounted from 12,000 up to 70,000 men. When vessels had to be manned, the mode of procedure was as follows: Ships that required men sent *press-gangs* commanded by officers into the ports to seize upon all the available seamen, even bursting into their houses & forcing them on board. This naturally led at times to open riots, nay to formal battles. The man thus forcibly enlisted had a small coin (the "Queen's Shilling" as it now is called) "pressed" into his hand, whence the term press-gang is said to have been derived. To hide seamen was forbidden under severe penalties; giving information of their whereabouts and delivering them up was rewarded.

When in times of war all this failed to satisfy the requirements of the navy, landsmen were taken on board; in 1664 Charles II. formed a regiment of Marines and in 1672 liberal listing-money was paid to volunteers. But as all this did not suffice, press-gangs seized every adult male they could lay hands on, and in every port of any size a press-gang office was opened, managed by a naval captain, who sent his gangs out to search the town and the surrounding country. Similarly sailors were forcibly taken out of merchantmen, and on one such occasion a struggle arose, in which three men lost their lives.

The desire to desert was under such circumstances naturally very great and leave of absence was therefore refused in all home-ports; by way of compensation men were allowed to be visited by their wives on board; a concession which led to much abuse and immoral scandal which was winked at by the authorities.

The War of Liberation of the North-American colonies made heavier claims than ever on the seafaring population. The numbers of the crews rose from 20,000 men in 1775 to 110,000 men in 1783, most of whom had been driven in by the press-gang. From want of a reserve of officers many men had to be appointed who were wholly unfit for their posts. The climax was reached, when in the war against the French Republic the requirements of the navy at one bound rose from 16,000 men in 1792 to 85,000 in 1794. In this latter year no less than 86 naval officers, among them 3 admirals and 29 naval captains, were engaged in press-gang work, and the violence and ruthlessness of their procedure greatly outstripped the worst of the harsh practices of Frederic William I. of Prussia in his forcible enlistment of tall grenadiers. All these efforts proving still inadequate the counties were assessed to raise a number of men in proportion to their population, paying bounty-money of £30 or even £70 per man. The counties sent the scum of the population emptying the highways of vagrants and the prisons of criminals; it is obvious that such crews could only be kept in order by the sternest discipline, which joined to the bad food and irregular pay of the men led in the middle of the war to the terrible mutinies of the navy in 1797.

This peculiar method of recruiting the navy, scoring as it did all law and humanity, had taken such firm root in the habits and mode of thought of the people of England, that even during the long period of peace after Waterloo, when humanitarian principles had taken a strong hold on all Christendom, no attempt was made to abolish the press-gang; down to the middle of the present century English Admirals declared, that the press-gang was one of the props of the greatness of England and was *absolutely indispensable*. But by that time public opinion had resolutely rejected this forcible enlistment, so that in 1852, just in time to derive the benefit of it in the Crimean War, the Admiralty adopted new methods for the recruiting of seamen for the navy, which turned out highly efficacious and led to a complete revolution and to a thoroughly beneficent reform in the manning of the navy.

2. Continuous Service.

After several changes and incidents the system of CONTINUOUS SERVICE has shaped itself as follows:

Lads and adults are allowed to enter the navy either on continuous or non-continuous service; in the latter case they bind themselves to five years' service, but skilled workmen are allowed to make a four-years' agreement; the present crews are almost exclusively recruited by lads who have entered the *continuous service* at an early age and have been trained for it. The normal time for entry is from 15 to 16½ years of age; the lad must be of a respectable family and produce evidence of his parents' consent; he must be able to read and write and do sums; he must be strong in body, sound in health, and free from bodily defects; at the age of 15 he must be at least 5 ft. 1½ in. high and measure 30 inches round the chest; at the age of 16½ he must be at least 5 ft. 3 inches high and measure 31 inches round the chest. Lads from prison or reformatories are excluded. Final admission is granted upon recommendation of the commanding officer of one of the training-ships, or coast-guard ships, stationed at different ports of the United Kingdom; at present, as a temporary measure, also by officers of the coast-guards and recruiting depôts in eleven large towns. On admission the lad binds himself to serve in the navy for 12 years from his 18th year, and he is then placed as a 2nd CLASS BOY on board of one of the nine training-ships, mostly old three-deckers placed in the chief ports on the south coast of England, in Queenstown in Ireland, and Queensferry in Scotland. Three of these ships are in Plymouth, which is regarded as the principal port for the training of sailors; the commanding officer of one of these ships is also inspector of all the rest. On board, the boys at once don the sailor's uniform and are excellently cared for; the food is abundant, the treatment is kind and they are allowed to spend seven weeks every year at home spread over three visits each year; their wages are 6*d.* a day. They are taught to keep themselves and their belongings clean and neat, and to wash and mend their clothes. In practical work they are taught splicing and knotting, boarding, handling sails (light sails on the drilling mast), rowing and sailing in boats, swimming, and cleaning the ships; also a little gunnery, practice with small arms and cutlasses; and along with all this they also receive lessons in elementary school-subjects. In recreation-time they have their playgrounds and athletic

exercises, and on board chess and draughts and books from the ship's library. Above all they are habituated to strict obedience, respect for their superiors, and good manners. To maintain discipline corporal punishment, though not excluded, for 2nd Class Boys, is restricted to a maximum of 24 blows with the birch, or 12 with the cane. One means of training of unsurpassed utility is the SAILING BRIG attached to every training-ship, which makes voyages for exercise five days a week with a number of boys on board and always returns to harbour every afternoon or evening.

After a twelve months' education (with talented lads ten months might be sufficient) the boys are allowed to go in for examination in seamanship and gunnery; this is conducted by the officers of their ship and those that pass are promoted to the rank of Boys 1st. class with wages raised to 7*d.* a day. They then receive more advanced teaching in seamanship, in signalling, in the use of the rigging, of small arms and the cutlass; when they have attained sufficient skill and practice in these several branches, they go on a six weeks' cruise in a sailing brig to continue their education in PRACTICAL SEAMANSHIP. Next they are sent either immediately or after a little while spent in a depôt-ship, on board a seagoing training-vessel for a six months' voyage, which is most advantageous to them in their education; or else they are at once distributed among the men-of-war. At the age of 18 the captain promotes them to the rank of ORDINARY SEAMAN, and they are now expected to be able to steer, take soundings, row, splice, knot, furl and reef sails, and understand how to fill every number at the gun, except No. 1. The wages then amount to 1/3 a day, or £1.17.6. a month. They continue to receive instruction in seamanship and are trained for service on a man-of-war; as soon as the lad has gained sufficient experience in this service as well as in steering, piloting, signalling, and gunnery-drill, to earn from his officers the certificate of "TRAINED MAN", his commanding officer promotes him at about 20 years of age to the rank of ABLE SEAMAN, (generally indicated by the letters A. B.) and now his wages are raised to 1/7 a day, and his training ON BOARD OF A MAN-OF-WAR is considered finished. Those able seamen, who shew aptitude for leading others are appointed by the commanding officer as LEADING SEAMEN as vacancies arise. These men are employed in posts of more or less responsibility and are suitably superintended.

Every able seaman is expected as soon as possible to go through a course of practice in a Gunnery School, of which there is one in

each of the three great naval ports. This course lasts nearly a year and both officers and men are instructed in the use of all arms, in rifle, pistol, and cutlass drill, besides heavy, quick firing, and machine-gun drill, in the use of gun-carriages and ammunition of every kind, and in the working of the hydraulic machinery in turrets and barbettes, and also in boat-and field service. Good marksmen, who in the final examination earn the certificate of 1st or 2nd Class, obtain the title of seaman-gunner and an increase of pay of from *2d.* to *4d.* a day, which is payable for five years, when they have to go through a requalifying course and earn a new certificate. Those who have earned a first class certificate, or are considered fit for the work on other grounds, can be appointed Gunnery Instructors; they have then to go through a second six months' course with special instruction and receive a further increase in pay of *8d.* per day; they may also go through a torpedo-course, and if they pass, they are appointed Torpedo-coxwains or Torpedo-Instructors. Every step upwards in promotion brings with it increase of pay. As with the naval officers so also with the lower ranks of seamen ample provision is made for a THOROUGH TRAINING in gunnery and torpedo and for singling out and advancing the men that are fittest for the work.

From among the leading seamen, who wear as a badge of distinction, an anchor on their left arm, and draw $1/9$ a day wages, are selected the 2nd CLASS PETTY OFFICERS, and from these again the 1st CLASS PETTY OFFICERS, who draw respectively $2/2$ and $2/5$ a day. The best of these latter may, if they pass the examination and are recommended to the Admiralty, be promoted to the rank of CHIEF PETTY OFFICER whose number is limited. Warrant officers, spoken of above are commonly selected from the petty officers, but there is no regulation to that effect.

Fault has been found with this system of training, that the boys who enter the training ships, coming as they do, from humble circumstances, are spoiled by their food, and general treatment and are apt to become conceited; also that the time spent by ordinary seamen in the dépôt-ship, where they are treated like men and get similar leave of absence, does them little good, and that in the ports their morals deteriorate. No doubt their subsequent education as seamen is interrupted by life in dépôt, and that is clearly a sore point; on the other hand it would be too costly to send those thousands on *sea-going* training-ships.¹ The enormous increase of the *matériel* of the navy led to a corresponding increase in the *personnel* of the

¹ A special dépôt-ship has now been instituted for them. The translator.

staffs, and yet boys have been entered far beyond the requirements, so that at one time, there were more than 1400 boys in one of the training-ships at Plymouth alone. In the summer of 1894 more than 4200 boys were borne on the lists of the training ships, 1954 on men-of-war in commission, more than 300 on other vessels of the navy, and upwards of 2000 in reserve. And even if it be conceded that all that was expected has not been realized, and that it may possibly be true that the extensive school-education imparted to such enormous numbers has put a term to the originality and spontaneous dash of the English Sailor on board a man-of-war, yet the advantages gained are beyond calculation. The former wild life, drinking, and excesses of every kind have all but ceased, and the men on leave are no longer the terror of the peaceable inhabitants of the ports; great attention is given to the practical and technical training which has become indispensable, and promotion is regulated by merit. On the steamers of modern days, which have no masts, it is far more difficult than formerly to foster in the seaman that smartness and ingenuity, that vigilance and hardihood, that faithfulness and sense of duty, and that absolute contempt of danger, which have always characterized the British tar, and have secured for the navy her numerous victories; but the most suitable remedy has been adopted; THE EARLY ENTRANCE INTO THE SERVICE at a time of life, when the disposition is still plastic, still open to be influenced by the example set by superiors, especially by officers, must tend to stiffen and strengthen the character, and make the men still do their duty in battle as they were wont to do in the days of old.

Table of Pay of Sailors.

Ratings	Year of 365 days	One day
Boy 2nd Class	£9 2 6	£0 0 6
Boy 1st Class	£10 12 11	£0 0 7
Ordinary Seaman	£22 16 3	£0 1 3
Able Seaman	£28 17 11	£0 1 7
Leading Seaman	£31 18 9	£0 1 9
Second Class Petty Officer	£36 10 0	£0 2 0
First Class Petty Officer	£39 10 10	£0 2 2
After 4 years' service as Petty Officer 1st Class .	£44 2 1	£0 2 5
Chief Petty Officer	£48 13 4	£0 2 8
After 3 years' service as Chief Petty Officer . .	£57 15 10	£0 3 2

The LENGTH OF SERVICE, lasting up to the age of 30 is an advantage that cannot be overestimated; it renders it possible not only to give thorough training to suitable persons in all the several branches of duty on board, such as the service of guns of various types and sizes and of torpedoes; of sharp-shooting, signalling, and service in the field, in boats, &c.; but also to *employ the men profitably for a long time. It is only with a personnel of long service that a ship can be brought to the highest possible point of efficiency.* Moreover to give emphasis to all the important duties *additional allowances* are made for the attainment of skill in their discharge, and these allowances are mostly independent of a man's rating; thus a trained gunner or torpedo-man receives 1*d.* a day; a seaman-gunner 2*d.* to 6*d.* a day; a torpedo-instructor 8*d.* a day; a captain of turret, in addition to other allowances, 3*d.* extra; teachers of gymnastics receive 4*d.* a day extra allowance.

GOOD CONDUCT is rewarded by "good conduct badges" and by extra allowances; the badges up to the number of three are conferred from time to time, and bring the wearer 1*d.* a day each at least and a man's extra allowances on that score may mount up to 3*d.* a day. By such means a man may increase his income very considerably. An able seaman, for example, may as a First Class Seaman-Gunner with a "good conduct badge" earn at the age of 23 £36. 10. 0. a year, instead of £28. 17. 11; four years afterwards, if he is a 2nd Class petty officer with one more such badge, he draws £45. 12. 6. All these regulations serve to stimulate the men to do their best.

After 12 years' service, which is in reality 14 to 15 years, if the time spent in the service as a boy is included, the man *has still no claim to a government pension*; to gain that he must engage to serve for 10 years more. As a rule 55% of the seamen do this at once, and 12% more after some little consideration. Of the stokers 73% re-engage in this way at once, and 12% soon after. If the re-engaged man continues to conduct himself well, he may increase his income still more. A P. O. 1st class of 13 years standing and who is accordingly about 31 years old, draws £57. 15. 10. a year, if he has served four years as a seaman-gunner and has three good conduct badges; a Chief petty officer at 33 years of age, if he conducts himself well and is a seaman-gunner, or a torpedo-man, or instructor in gunnery may even raise his income to about eighty guineas a year.

After 22 years, that is at the age of 40, the man is entitled to a

long-service pension. This amounts at least to £18. 5. 0. a year, but as service in the rank of petty officer counts for double time and good conduct may be added on, the pension may rise to £52. 0. 0.; the average pension is about £30.

On board, the men have frequent opportunity of sending money to their relatives by postal orders, or of putting money by in the savings bank. Moreover they are allowed to receive money value for rations they have not drawn, where however they do not get the full amount. By such means thrifty men may in the course of their long years of service accumulate considerable amounts.

In conclusion we will enumerate the INSTITUTIONS FOR THE TRAINING OF BOYS, which are not intended primarily to supply the Royal navy; their aim is to rear lads for the COMMERCIAL NAVY, and above all to subserve educational and humanitarian purposes; nevertheless some of the boys do enter the Royal navy. The education of the boys is carried on exclusively on board of disused battle-ships; such as obsolete ships-of-the-line and frigates, lent by the Admiralty to benevolent institutions, that devote themselves to the education and even the rescue of boys. Beyond the loan of the ships these associations receive no support whatever from government. There are, as far as we know, no less than eighteen such ships engaged in this philanthropic work; they lie at anchor in the Thames, at Liverpool, and in nine other ports of the United Kingdom; some of them are supplied with tenders similar to Royal Training-ships. Of these 18 vessels, 3 are *reformatory school-ships*, the others are devoted to the education and training of officers and of cabin-boys.

All these ships, except one, are governed by former naval-officers. The following list gives their names, stations, and number of boys.

Training Ships.

	Name	Tonnage	No. of boys	Stations
1	Worcester	4725	155	Thames
2	Conway	4375	200	Liverpool
3	Havannah	1408	100	Cardiff
4	Arethusa	3832	300	Thames
5	Indefatigable . .	2626	250	Liverpool
6	Warspite	4579	300	Woolwich
7	Exmouth	4382	600	Thames
8	Clio	2306	280	Menai Straits

	Name	Tonnage	No. of boys	Stations
9	Mount Edgecumbe	2300	250	Saltash near Devonport
10	Wellesley .	2996	300	North Shields
11	Formidable	3594	350	Portishead near Bristol
12	Empress	5260	450	Clyde
13	Southampton . .	2300	250	Hull
14	Mars	3842	400	Newport (Fife)
15	Grampian	5724	250	Belfast

Nos. 1 and 2 are Naval Colleges for the education of young gentlemen to become officers in the mercantile navy and the Royal Naval Reserve. A certain number are admitted directly into the Royal navy. Nos. 3 to 7 are school-ships for the education of poor and even homeless boys of unblemished character, for a sea-faring life in the Royal or mercantile navies.

Nos. 8 to 15 are certificated Industrial Schools, to which boys may be sent by the magistrate for minor offences, such as truancy, &c.

There are also three Reformatory School Ships:

Reformatory School Ships.

	Name	Tonnage	No. of boys	Station
1	Cornwall .	2917	260	Thames
2	Akbar . .	2912	210	Liverpool
3	Clarence	4759	300	Birkenhead

From the three last named ships no boys are admitted into the Royal navy; the others supply with lads partly the mercantile navy and partly the Royal navy and a considerable number enter the army. For example the "Warspite" which is a private adventure school and is managed by a former commander R. N., receives on board only honourable, well-disposed boys, who wish to become sailors, are certified by a surgeon as being physically fit for this calling, and duly developed in body; in the years 1889—1894 this one institution sent on an average every year 40 boys to the Royal navy and 218 to the mercantile navy. For every boy received in the Royal navy the Admiralty contributes £25 to the Society. The "Exmouth" which is devoted to the education of poor children, supplied in the course of

14 years 1000 boys for the mercantile navy and 500 for the army. On the whole these 18 ships send yearly hundreds of boys on board, who have received some degree of professional training; this is of very great advantage to the nation, in view of the vast extent of the Royal and mercantile navies of England, and of the dearth¹ of sailors.

The *Personnel* of the engine-room is sometimes included among the "Bluejackets," because they wear a similar blue uniform, but they form a special class of the ship's crew.

k. The Personnel of the Engine-Room.

The *Personnel* of the Engine-Room is divided into two organisations, wholly independent of each other; the STOKERS, who attend to the boilers, and the ENGINE-ROOM-ARTIFICERS, who under the superintendence of the engineer in charge attend to the engines, effect repairs, &c. and may be employed as engineers in charge in smaller vessels, which are not torpedo-boats.

A STOKER is only required on entering to be more than 19 years of age, to have a sound constitution, and to be able to read and write. His first appointment is as stoker second class with wages of 1/8 a day; he is now instructed on board of a dépôt ship in the use of the rifle, the revolver, and the cutlass; also in rowing and in gymnastics. He may then immediately receive his appointment as stoker and coal trimmer, with wages of 2/- a day (£36. 10. 0. a year). Leading stokers and chief stokers are taught to attend to the engines of torpedo-boats in such a manner as to be able to take charge of them; when they have proved their capacity for this kind of employment, they are called TRAINED MEN, indicated by the letters T. M. and receive higher wages. If a stoker shews himself fit for the work and has a good conduct badge, the captain may make him chief stoker with the rank of chief petty officer. He is now put in charge of the engines of tenders, and of the hydraulic apparatus, and he also looks after the double bottom, the watertight doors, &c. and is employed in the issue and account of the stores etc.

The conditions for promotion from the rank of leading stoker to that of chief stoker are: Ten years' service as stoker, excellent con-

¹ There is really no dearth just now; recently the Admiralty had to reject all special entries to keep the supply down. The translator.

duct, great experience in the service, and ability to read and write with ease. This promotion is also in the hands of the captain and confers the rank of chief petty officer; he is employed in the most responsible posts within the range of his service, his rank being the highest attainable by a stoker.

Numerous complaints are made with respect to the training of stokers. No technical knowledge is required of them when they enter, and stokers by trade are hard to get, because their wages on commercial steamers are nearly twice as high as in the Royal navy, where moreover the range of their duties is much larger; consequently the recruiting officers sent out into the country have met with but small success.

On board the dépôt ship the novice has scant opportunity of acquiring technical knowledge, and training ships for stokers do not exist.

Table of Wages of Stokers.

Ratings	Continuous Service		Non-continuous Service	
	Year of 365 days	One day	Year of 365 days	One day
Stoker 2nd Class	£30 8 4	£0 1 8	£25 17 1	£0 1 5
Stoker & Coal Trimmer	£36 10 0	£0 2 0	£31 18 9	£0 1 9
Leading Stoker 2nd Class	£41 1 3	£0 2 3	£36 10 0	£0 2 0
Ditto 1st „	£45 12 6	£0 2 6	£41 1 3	£0 2 3
Chief Stoker				
Under 3 years service as such	£54 15 0	£0 3 0	—	—
Over 3 years ditto	£63 17 6	£0 3 6	—	—
„ 6 „ „	£73 0 0	£0 4 0	—	—
„ 9 „ „	£82 2 6	£0 4 6	—	—
„ 12 „ „	£91 5 0	£0 5 0	—	—

ENGINE-ROOM ARTIFICERS were first appointed in March 1868 partly to supply engineers with the assistants, which the ever increasing size of the engines had rendered absolutely necessary, and partly to diminish the very large number of professional engineers on board. The arrangement turned out so satisfactory, and the number of artificers so rapidly increased that in 1889/90 the number employed was 1289 and in the year following 1475, one fifth of whom were chief engine-room artificers.

At present the terms for *admission* are:—the candidate must apply at one of the large naval ports, and be not less than 21, nor more

than 28, years old; he must be sound in body, not less than 5 ft. 4 in. in height and measure at least 32 inches round the chest; he is to be a trained engineer, or boiler maker, or smith, or coppersmith; must know the four rules of Arithmetic, be able to write fairly well and have a general knowledge of marine engines and their management, knowing for example what to do in case of priming. On all such points he is examined by two chief-engineers, one being the head engineer of the station; if he passes he receives his appointment as acting *Engine-room Artificer* drawing £100.7.6. a year (5/6 a day).

If he conducts himself well for some years, and on being examined by two engineers in presence of the officer in command proves himself fit to take charge of the stokehold, the officer in command appoints him *Engine-room Artificer 4th Class*; a rank which brings no increase of pay. All subsequent *promotion* is made by the commanding officer by selection without further examination.

Table of Wages of Engine-Room Artificers.

Rating	Year of 365 days	One day
Engine-room Artificer on appointment	£95 16 3	£0 5 3
Ditto after 3 years' service as such	£104 18 9	£0 5 9
Ditto after 6 years' service as such	£190 10 0	£0 6 0
Ditto after 10 years' service as such on re-engaging for a further term of 10 years as such	£114 11 3	£0 6 3
Ditto ditto 13 years as such	£118 12 6	£0 6 6
Engine-room Artificer 4th Class ¹ (new classification)	£100 7 6	£0 5 6
Ditto 3rd Class	£104 18 9	£0 5 9
Ditto 2nd Class	£109 10 0	£0 6 0
Ditto 1st Class (Provided he has engaged for a further term of 10 years)	£118 12 6	£0 6 6

There are two² higher stages still amongst the engine-room artificers, viz: Those of chief engine-room artificers 1st and 2nd class, promotion to which is by selection, and entirely in the hands of the

¹ After 3 years' service an Artificer of the 4th Class may, if he is found fit for the work, be put in charge of the engines of a small ship. Good conduct is indispensable for promotion at every one of these stages, and the Artificer takes equal rank with the C. P. O. during the whole time of his service.

² The rank of "Engineer Artificer" has been recently created; it is that of a warrant officer. The translator.

Admiralty. The conditions for the attainment of this rank are: an age of not less than 27 years; service of 8 years as engine-room artificer, 5 years of which must have been spent at sea; throughout the whole time of his service excellent conduct and proved capacity, and especially and finally the possession of the required scientific knowledge. The examination is conducted by a chief inspector of machinery and by a senior engineer. For promotion into the 1st class the only qualification is 6 years' satisfactory service as chief artificer of the 2nd class, which is consequently impossible before the age of 33. At home this promotion is confirmed by the Admiralty, on foreign stations by the Commander-in-Chief of the station. Both classes rank with the chief petty officers. In consequence of the want of engineers and the scanty numbers of the crew, the chief artificers are often employed on board large ships as engine-room watchkeepers and in small vessels as in charge of the engines, and draw the corresponding allowances, although they rank merely as petty officers.

Table of Wages of Chief Engine-room Artificers.

Rating	Year of 365 days	One day
Chief engine-room artificer (old system) on appointment	£123 3 9	£0 6 9
Ditto after 3 years' service as such	£127 15 0	£0 7 0
Chief Engine-room Artificer, 2nd. Class (new classification)	£127 15 0	£0 7 0
Ditto 1st class	£136 17 6	£0 7 6

It seems that it is solely the high pay that attracts so many good men into this branch of the service, in spite of the fact that the duties are arduous, the accommodation on many of the new cruisers wretched, and promotion even to the rank of warrant-officers wholly excluded. It appears however that it is intended to remove this latter grievance.¹

The *personnel* of the engine-rooms is divided into three categories, which are kept rigorously apart; the upper category of engineers, who enter the service at an early age, and may advance to the highest posts accessible to men of technical training, and two lower categories of men, who without any preliminary education, at once enter the practical service, and can never rise beyond the rank of² petty officer. This peculiar arrangement is another instance of the

¹ This has since been done as stated on foot note on p. 167. The translator.

² Now Warrant. The translator.

lack of systematic organisation, not infrequently met with in England, where people content themselves with remedying evils as they make themselves felt from time to time. During the last 10 or 15 years much has been amended in the navy in this respect, but in the organisation of the *personnel* of the engine-rooms, which many persist in considering a necessary evil, the country has not kept pace with the progress of the times.

1. The Artificers on Board.

The Artificers on board (other than engine-room) viz: Carpenters, Caulkers, Sailmakers, Blacksmiths, Armourers, Torpedo-Artificers, Plumbers, Coopers, and Painters are appointed much in the same way as the Engine-room Artificers; they must have acquired their technical training on shore, and *not* in the navy, and must furnish proof that they have served to their trade an apprenticeship of a reasonable number of years.

Some of these branches, or ratings, like the caulkers, plumbers, sailmakers (that is, those of the lowest ratings) and carpenters of the 2nd class are allowed to die out, their services being no longer required in iron ships without sails, and the torpedo-artificers are being classed with the armourers.

The applicant to *enter the service* must, as a rule, be 18 years of age; he must be bodily fit for the work and pass a practical examination, which is conducted by the respective warrant-officers; for example, the coopers by the chief cooper, the sailmakers by the boatswain and chief sailmaker, but shipwrights, painters and plumbers are examined by technical officials of the dockyard reserve of one of the large naval ports at home, and armourers by officers of gunnery and torpedo school-ships. Armourers may also be appointed by the captain of a school-ship, the men of other branches by the corresponding officers on board. The wages are abundant; a carpenter draws £42. 11. 8. a year (£0. 2. 4. a day), the shipwright who must be 21 years old, and must have served an apprenticeship of 5 to 7 years, and shew satisfactory skill in working in steel, iron, and wood, draws £73. 0. 0. a year (£0. 4. 0. a day).¹

The main condition for *Promotion* is, besides good conduct, practical skill, and experience; in some cases one year's service in the preceding

¹ For full tables of Wages see Navy List. The translator.

rating is required. The examinations, which are almost exclusively practical are conducted mostly by technical officials of a dockyard at home, and promotion is awarded partly by the officer commanding the ship, and partly by the Commander-in-Chief. For example the latter appoints the chief carpenter's mate, who must be at least 24 years old, must have served one year as mate, be able to read and write well and pass a practical examination in the dockyard-reserve; his wages are £82.2.6. a year ($\frac{4}{6}$ a day). The blacksmith begins as a mate (petty officer) and draws £50.3.9. a year ($\frac{2}{9}$ a day), and after 5 years' service his wages rise to £60.16.8. a year ($\frac{3}{4}$ a day). The armourer's position merits special attention. He has been carefully trained in the training-ship in gunnery and torpedo-practice and has at each step been examined by officers of this ship. To be appointed armourer's mate he need only be 18 years old and draws £48.13.4. a year ($\frac{2}{8}$ a day), as armourer £63.17.6. ($\frac{3}{6}$ a day) and as chief armourer £73. (4/- a day), and after 6 years' service as such he draws £109.10.0. ($\frac{6}{-}$ a day). To obtain this latter rating he must have excellent conduct and great skill, be recommended by the captain of the said school-ship, and have passed an examination conducted by the staff-officers of the gunnery and torpedo school-ships; the appointment is exclusively in the hands of the admirals commanding at Portsmouth and Devonport.

Of these several artificers only the carpenters attain the rank of warrant-officers, and the chief carpenter is a commissioned officer.¹ Like this latter, all the carpenters are regarded as non-combatants and can under no circumstances, whatever their rank may be, assume any military command, unless perhaps over a boat or over a landing party.

m. The Ship's Police

is recruited by volunteer applicants from the seamen or marines, and stokers also are not excluded. There are three ratings: Corporal 2nd class, Corporal 1st class, and Master-at-Arms. The junior ratings of the ship's police are appointed by the commanding officer, if they were originally seamen, and by the Admiralty, if they are drawn from the marines. The qualifications for this appointment are: An age of 25 to 30 years, three years' sea service either as seaman or as marine, very good conduct during the last

¹ Often called a Chief warrant-officer for convenience of expression. The translator

three years, height at least 5 ft. 7 in., ability to read and write fluently, and to keep the necessary ship's lists; he must engage for 12 years, or till he has reached a service of 22 years, which entitles him to a pension. The examination referring thereto is held at home by two instructors of the marines in presence of the commandant. The pay of £42. 11. 8. a year ($\frac{2}{4}$ a day) rises at the rate of £6. 1. 8. every three years till after 6 years' service as such the maximum is reached viz: £66. 18. 4. a year ($\frac{3}{8}$ a day).

The junior ship's police may be promoted to the rank of *corporals of the 1st class* at the same age, after two years excellent conduct, if they pass the examination satisfactorily; this promotion is reserved to the commanding officer of the general dépôt at Devonport.

Promotion to the rank of *Masier-at-Arms* is also the prerogative of the Commander-in-Chief at Devonport. The candidate must be more than 25 years of age, must have served at least one year as corporal in the ship's police, but need not have passed through all the grades of this force. He must be well acquainted with the duties in the interior of the ship, especially that of the ship's police, be familiar with its regulations, and be altogether well fitted for the post. The examination is conducted by the commanding officer and a naval instructor. The pay commences with £73 a year (4/- a day), rises every 3 years by £9. 2. 6. a year (6d. a day), till after 12 years' service the maximum of £109. 10. a year (6/- a day) is reached.

We see that the ship's police is handsomely remunerated, but its duties are not pleasant; to keep order on board, to prevent infractions of regulations, to report defaulters of any kind, to keep the punishment register, to inflict the punishments, all these are duties that do not tend to make the men's position other than disagreeable and even painful.

n. The Ship's Cook

is an important personage on board, the food and its proper preparation being of supreme importance to the crew, who have so few enjoyments of any other kind. Formerly the ship's cook was one of the permanent officers on board, like the warrant-officers appointed by the Admiralty. It is different now. The applicant for the post of ship's cook may be appointed by the Commander-in-Chief at Portsmouth as 2nd ship's cook or cook's mate, if he is 18 to 25 years of age, at least 5 ft. 5 in. high, and can cook and bake. He receives

£22. 16. 3. a year ($\frac{1}{3}$ a day). If he has successfully passed through the school of naval cookery at Portsmouth, and is willing to make a 12 years' engagement, he may be appointed cook's mate by the commanding officer of his ship, drawing a salary of £28. 17. 11. a year ($\frac{1}{7}$ a day). The qualifications of a *second ship's cook*, who has the rank of a petty officer, are:—that he must be more than 24 years old, must have visited the cookery school for six months, and be able to cook and bake for 150 persons, and prepare yeast. The qualification of a *first ship's cook* are:—that he must be more than 26 years old, have served three years as cook's mate and be able to cook for 300 persons. Up to that point the promotion rests with the commanding officer, and the wages are respectively £41. 1. 3. a year ($\frac{2}{3}$ a day), and £50. 3. 9. a year ($\frac{2}{9}$ a day). The highest rating, that of chief cook, ranks equal with a chief petty officer; it requires an age of more than 28 years and in addition to the above-named qualifications the candidate for that post must have served three years as ship's cook, and be able to cook for more than 300 persons. His wages are £54. 15. 0. a year (3/- a day), and rise after 3 years service as such to £63. 17. 6. a year ($\frac{3}{6}$ a day).

o. The Ship's Steward

issues the rations and clothing under the superintendence of the paymaster. The *ship's steward's boy* is drawn from the school at Greenwich to be described hereafter. He must be $14\frac{1}{2}$ to $16\frac{1}{2}$ years old and pass an examination held by the paymaster. He is then appointed by the commanding officer and draws £10. 12. 11. a year (7d. a day). At the age of 18 he may be appointed *ship's steward's assistant* on board, if he proves that he possesses the necessary knowledge in an examination held by a lieutenant and the paymaster; he then draws £24. 6. 8. a year ($\frac{1}{4}$ a day), and after 3 years' service as such, and on approval of the Admiralty his wages rise to £33. 9. 2. ($\frac{1}{10}$ a day). Having served three years as assistant, rendered good service, and proved his capacity for the post of *steward* in an examination held by two paymasters, the Commander-in-Chief at Portsmouth may promote him to the rating of steward, which confers the rank of chief petty officer. Beyond that he cannot rise, but his wages steadily increase according to the following table:—

Service	Year of 365 days	One day
On appointment	£54 15 0	3 0
After 5 years' service as such and on approval of the Admiralty	£73 0 0	4 0
After 10 years' ditto	£91 5 0	5 0
" 15 " "	£109 10 0	6 0
" 20 " "	£127 15 0	7 0

The career of a WRITER, who is also drawn as a boy from the school at Greenwich is similar to the one just described; it terminates with the post of chief writer, who draws £91. 5. 0. a year (5/- a day).

The candidate for SICK BERTH ATTENDANT must pass through a six months' course at the Haslar hospital, and may rise after 14 years' good service to the post of chief sick berth steward, ranking with the chief petty officers and drawing £73. a year (4/- a day).

Boys of the 2nd class may be trained as buglers or musicians on board the school-ships, provided they are 14 years old, and that the consent of the commanding officer has been obtained; they are then placed on board of a man-of-war. The corps of musicians is however mostly recruited from professional musicians on shore; in the Mediterranean principally by Maltese and Sicilians.

There remain yet to be described as a main constituent part of the complement of men on board, that is to say of the military part:

p. The Marines.

1. History.

In the Middle Ages, battles at sea were mostly fought out by boarding; it was therefore customary to put regular soldiers on board ships intended for fighting; this practice was however gradually dropped, when firing broadsides was introduced. In the struggle against the Armada, the English, as has already been stated, carefully avoided being boarded and the decision was arrived at by firing at long range. Barely 80 years after that, viz: in 1664, Charles II. formed the first regiment of MARINES, of 1200 men, for service on board; partly, no doubt, to facilitate the manning of the fleet for the anticipated war with Holland; partly also to place at the disposal of the commanders a reliable body of men for the enforcement of

discipline, and possibly also to have a small standing army at his own disposal, the maintenance of such a force on shore being contrary to the law of the land. The embarkation of landsmen, who turned sea-sick did not prove advantageous at first; the men had first to become inured to the sea and to be trained in the use of arms on board. In 1698 the number of marines had been raised, so that they now formed four regiments; but during the long time of peace following upon the War of the Spanish Succession, the English fleet ruled the sea, and it seems that the institution of marines was allowed to a great extent to lapse. During the Seven Years' War, under the energetic rule of the Elder Pitt, Admiral Anson greatly increased the number of marines or rather newly created them. Since that time they have formed a permanent and important part of the *complement of men on board of every man-of-war*, and play an important rôle in all sea-fights and landings. For a long time there existed a certain mutual antagonism between seamen (the bluejackets) and marines (the redcoats); but in consequence of the introduction of the 22 years' service this has all but vanished. Since the disappearance of the rigging, in the service of which the marines were not employed, seamen have ceased to regard marines as inferiors, and at present the latter take part in almost all the work of the bluejackets.

2. Present State of Affairs.

Marines are enlisted in the same manner as soldiers of the line. The qualifications for admission are:—the applicant must not be less than 17, nor more than 30 years of age, he must be at least 5 ft. 5 inches high, and measure 32 inches round the chest, if under 18 years of age and 33 inches, if over that age. He enlists for 12 years. Recruits for the marines present themselves everywhere, except in London, more readily than for the army on shore. Even men, who have already served in the army, willingly enlist in the marines; partly being attracted by a seafaring life, and partly because the man is materially better off and may marry. After a long voyage a marine sometimes returns home with a nice little sum to the good.

The recruit receives the same uniform and kit as the soldier on shore; he first joins the depôt at Walmer near Dover, where he is drilled for eight months, trained in the duties of a soldier and in the service of ship's guns in a specially constructed practising battery. He is then sent to join his corps, either the artillery or the infantry

whichever he prefers. The former, in blue artillery uniform, is stationed at Eastney by Southsea, near Portsmouth; the latter, far more numerous, wears the red coat of the army and is distributed over the three great Naval Ports at home. The marines, especially the gunners, have beautiful large barracks with excellent arrangements for the recreation, amusement, and instruction of the men, such as playgrounds, reading rooms, social halls, libraries, &c. Their training, especially in naval gunnery, is continued, and marines have every opportunity offered them to learn some trade, or to pursue general studies; this lasts, till the man's turn for embarkation has come according to the roster.

The conditions for *promotion* to the rank of corporal are:—the man must be an excellent and smart infantry-man or gunner, able to read and write and do some sums, and he must have been six months at sea. The latter point, which is intended to make the man proof against sea-sickness and accustomed to life on board ought to carry great weight; however this is not uniformly the case, promotion being given by the commanding officer of the division upon the recommendation of the adjutant, and not by the officer in command of the ship.

On shore the rations of the marines are the same as those of the army, on board as those of the sailors; a marine may therefore draw a part of his rations in the shape of money and save up. In addition to the uniform customary on land, the marine receives also a white suit with a tropical helmet. He takes part in all the service on board, especially in gun-drill, clearing for action and cleaning the ship, &c.; but he is not required to go up aloft. On the other hand, guard is mostly mounted by the marines, and some are employed as mess-attendants, servants, and post orderlies. On board, the marine loses a great deal of his awkwardness; he grows smart and deft, but still he does not wholly get rid of his stiff and rigid bearing.

The detachments on board are from time to time inspected both at home and abroad by superior officers of the marines.

When the man returns from embarkation his name is placed at the bottom of the list; gradually he moves upwards till he again stands at the head; this sometimes happens unexpectedly and very rapidly.

Table of Wages of the Royal Marines.

Ranks	Artillery		Light Infantry	
	Year of 365 days	One day	Year of 365 days	One day
Colour Sergeant	£73 0 0	£0 4 0	£59 6 3	£0 3 3
Sergeant	£62 7 1	£0 3 5	£47 2 11	£0 2 7
Corporal	£50 3 9	£0 2 9	£34 19 7	£0 1 11
Bugler	£26 4 8½	£0 1 5½	£22 16 3	£0 1 3
Bombardier	£45 12 6	£0 2 6	—	—
Gunner	£26 4 8½	£0 1 5½	—	—
„ 2nd class	£24 6 8	£0 1 4	—	—
Private	—	—	£21 5 10	£0 1 2

The pay of the artillery men is seen to be much higher than that of the infantry, but on the other hand far higher knowledge and greater skill are expected of the former than of the latter. The artillery of the marines is a picked body of men, so well trained that according to the opinion of some people their power is thrown away on board ship where it has not scope enough to be fully exploited.

q. Strength of the Naval Forces.

From the *personnel* above enumerated the number of men employed in the navy can be calculated. In 1884 the total amounted to only 60,000 men, but since then both material and men have been largely increased.

In the year 1898/99 there were borne on the list:

Admirals (for the active service of the fleet)	15
Higher officers and combatants and non-combatants	3317
Subalterns, combatants and non-combatants	690
Warrant-officers	1159
Petty officers and seamen	66828
Boys (for the active service of the fleet)	3700
Seamen, engineers, artificers, &c.	Total . . 75709
Marines:	
Officers	444
Staff Sergeants and sergeants	1283
Buglers and musicians	604
Rank and file	15476
	17807

Grand Total 93516men.¹

Exclusive of Coast Guard 4200, and "Other Services" 8674.

To these have yet to be added the *personnel for the complements of men on board of the second line*, the organisations described above under section B. IV, which are under the authority of the office of naval reserves, the coast-guard, the naval reserve, and the reserve of naval pensioners.

r. The Coast-Guard.

Up to 1857 the coast guard belonged to the domain of the Chancellor of the Exchequer. They were employed exclusively as custom-house officials, in repressing smuggling, which was carried on on a large scale. In consequence, however, of troubles and inconveniences that arose, especially with the *personnel*, and as moreover the men had to watch *maritime* frontiers, it was determined to transfer the coast guard to the Admiralty, to give them a military organisation, and to recruit them from officers, warrant-officers, and men of the Royal navy who had honourably served their time. This measure secured a threefold advantage: the custom-house duties were discharged very efficiently by able and trustworthy men; the authorities had upwards of 4000 posts at their disposal to provide for their meritorious servants, and the whole force became available as a reserve of the navy in case of mobilisation.

This corps of coast-guards (about 4100 men) has now a military organisation and is commanded by 70 energetic naval officers (Commanders and Captains), who have voluntarily joined the coastguards and renounced all hope of further promotion.¹ The force is recruited by seamen who have served their time, have passed through a course of training in gunnery being seamen-gunners, or have been otherwise thoroughly trained (T M.).

The coast guards are, like the coasts of the United Kingdom themselves, divided into nine districts, whose headquarters are at the ports of Harwich, Hull, Queensferry (in the Firth of Forth), Holyhead, Kingstown (near Dublin), Tarbert (on the Shannon), Portland, and Southampton. Each of these districts has a coast-guard ship manned by a reduced crew. These ships are either obsolete battle-ships (of these at present there are 5) or large cruisers (at present 4), which lie at anchor in or near their respective harbours. As a rule they leave their stations only once a year for a few weeks to take part in the large annual manœuvres of the fleet. They form the FIRST

¹ See above p. 124.

LINE OF NAVAL RESERVES, under the command of the Admiral Superintendent of Naval Reserves, whose flag as commanding his squadron is flying in the battle-ship "Alexandra" at Portland. There are about 700 coast-guard stations; in addition to them the coast-guards man 23 custom-house cruisers, partly steamers and partly sailing-vessels, and a number of small ships besides. The coast-guards' first duty is to repress smuggling, but they also protect the fishing industry along the coast, succour ships in distress, give shelter to ship-wrecked men, take charge of goods washed ashore, &c. Lately they have also been employed, like the light-house men, in watching the coasts. The Admiral in charge keeps up communication with the Commissioners of Custom in all that concerns the custom-house service, and with the Board of Trade in matters of rescue, &c. Once a year he inspects the coast-guard ships and all the stations and vessels.

In case of need the Admiralty may at any time call out the coast-guard to join the fleet, so that this first line of naval reserve, consisting of none but trained and tried men, is ready at very short notice.

s. The Royal Naval Reserve

consists of captains, engineers, and crews of the mercantile navy, who, in return for certain advantages, engage to enter the Royal navy in case of war. To fit themselves for this service they have to pass through a course of training in one of the coast-guard ships, or in one of the nine drill-ships, especially equipped for that purpose. These vessels are chiefly men-of-war of moderate size, mostly obsolete, but a few are new; they are commanded by a commander or senior lieutenant, and stationed in London, North Shields, Leith, Dundee, Aberdeen, Inverness, Liverpool, Bristol, and Southampton, that is to say in the most frequented English and Scotch commercial ports. Thirty-three drill-batteries are erected on different parts of the coast.

The following are the qualifications for the post of OFFICER IN THE NAVAL RESERVE, who are entered *direct* from the Mercantile Marine:

A lieutenant requires to have one year's sea service as Master; a sub-lieutenant must have one year's sea service as First Mate, and must possess an ordinary Master's Certificate of Competency under the Merchant Shipping Act.¹

Afterwards an officer of the naval reserve must go through a yearly

¹ For fuller details on these and other officers' appointments see Navy List.

drill of 7 to 28 days' duration in one of the above-named ships, or in an English man-of-war abroad. Similar regulations are in force with respect to midshipmen and naval cadets. During the time of such drill the men draw the regular allowances of their ranks and receive moreover a yearly money retainer of £25 for a lieutenant, £20 for a sub-lieutenant, and £10 for a midshipman. They are bound to report themselves once a year to the Admiralty, and once again immediately on the outbreak of war, and they must forthwith present themselves when called out.

The following is the number of officers at present employed in the Royal Naval Reserve;

Lieutenants	352	} This number does not include about 200 Honorary officers of this force.
Sub-lieutenants	513	
Midshipmen	511	
Senior Engineers	57	
Engineers	134	
Assistant Engineers	110	
Total number of officers		1677

A part of these officers have gone through a course of gunnery and torpedo practice of about four months' duration, some have been engaged for a twelvemonth's probationary service in the Royal navy, whilst in the autumn of 1895 the dearth of junior naval officers was so great, that 100 "Supplementary" lieutenants and sub-lieutenants were appointed, with restrictions however in the regulation of their promotion.

The CREW of the Naval Reserve only requires a yearly drill of 28 days' duration on board one of the said ships; but this drill may be gone through on land at one of the drill-batteries. The seamen are divided into two classes, the first receiving £6 money retainer, and one suit of clothes a year, the second £2. 10. 0. to £3. 15. 0. every year and a suit of clothes every other year; stokers also receive £6 a year. On the lists there are borne 10,800 first class seamen, 10,600 second class seamen, and 2500 stokers, about 24,200 men, and inclusive of the officers a grand total of close upon 26,000 men.

The actual force will differ but little from the nominal force registered; the deficiency of 17,700 men of 10 years ago was four years ago reduced to about 1100 men.

t. The Seaman-pensioner Reserve

comprises those pensioners of seamen and engine-room artificers, who volunteer their services, when they still are fit and ready for work; they bind themselves to pass yearly through a fortnight's drill and engage to re-enter the service, if called upon to do so. As seamen are not entitled to a pension till after 22 years' service, not counting the service as boy (pensions for wounds always excepted), these men cannot be less than 40 years old; the obligation to serve however terminates with the 55th year. During drill-time and when on duty they draw the usual allowances in addition to their pension, and after their 55th year they are entitled to an extra allowance, if they have attended drill for six consecutive years. The number of pensioners at present exceeds 1200, of whom about 200 are engine-room artificers. The average cost is about £31 a year per man.

Inclusive of 4200 coast-guards, 25,700 naval reserve-men and 1200 pensioners, the total reserve-force of the navy amounts to about 31,150 officers and men; of this force about half are abroad and therefore not at once available.

u. Pensions and Allowances.

We have so far dealt with the pay and wages of officers and men; also with half pay and retired pay of the officers. There remain yet to be mentioned the *Extra Allowances*, as well as pensions and special pensions of the men. From of old *Prize-money* was considered lawful in the English navy, and prizes have played an important part in English maritime warfare.

The practice of privateering was based wholly on that law, and in view of the high money-value of some prizes, officers and men were stimulated to extraordinary exertion by the prospect of such great gain. Prizes are captured during peace as well as in war; at present they are mostly slavers on the east coast of Africa. For example in 1889 H. M. S. "Griffon" captured six dhows, which when sold, yielded the captain £85; H. M. S. "Reindeer" in 1890 took five dhows, yielding the captain £135. By the latest regulation, by Order in Council, dated 3rd August 1886, the Commander-in-Chief of the squadron draws one thirtieth of the prize-money and the captain one

tenth of the remainder; every man of the crew has a share allotted to him, all being divided into eleven classes, in the lowest of which the boys are, of whom each receives one share. Second class petty officers receive seven, first class petty officers ten shares and so on.

Salvage Money, if earned by rendering help, is distributed in the same proportions as prize-money.

Extra Allowances are granted to "navigating parties," that is to those who take a ship not in commission from one port to another; also for trial trips, and trips to sea to try the guns, &c.; likewise for repairing engines and boilers, &c.; and finally for diving, from 1/6 to 6/- per hour, according to the depth of the water from 1 to 6 or 20 to 25 fathoms.

For good conduct the men have *Good conduct badges* awarded them, for each of which the man is entitled to 1*d.* a day extra. Seamen receive their first badge after three years', marines after two years' good conduct; the second badge seamen get after eight, marines after six years' good conduct, and the third badge after thirteen and twelve years respectively. If after 15 years' good conduct the man is recommended by his captain he becomes eligible for a good conduct MEDAL, and the Admiralty may award him, at their own discretion, a yearly gratuity of £2 for a chief and first class petty officer, £1 for a second class petty officer, and 10/- for a leading-seaman. These several sums, which may mount up to £15 for a chief and first class petty officer, £10 for a second class petty officer, and £7 for a leading-seaman are paid when the recipient retires from the service. A man may also earn a Medal for *conspicuous gallantry*, and in the case of a chief and first class petty officer the Admiralty may accompany it with an annual allowance of £20.

After 22 years' service a man is entitled to a pension, the good conduct badges being taken into consideration, when its amount is fixed. Without any badges the pension amounts to 11*d.* a day, with them to 1/1 a day. After 32 years' service the man receives, irrespective of badges, the maximum amount of 1/2 a day; extra consideration however is given for the time served as petty officer, the superior petty officer receiving ½*d.*, the inferior ¼*d.* a day over and above the maximum. For men of continuous service these latter allowances are doubled, so that in the most favourable case the pension may mount up to £45. 12. 9. a year.

A pension is due EARLIER only if the man has become unfit for

service through no fault of his own. If he is incapable of earning a living and was in continuous service for 10 years he receives 6*d.* a day for life, if for 15 years 7*d.* a day. Good conduct of a petty officer receives a double award.

In addition the man may draw a further allowance for MUTILATION in the service, viz: If he lost two limbs and is comparatively helpless he draws from 1/6 to 2/- a day; for the loss of one limb or of one eye 1/- to 1/6 a day; for wounds of less severity he receives an allowance of 3*d.* to 1/- a day according to his earning capacity, and if he is totally blind 3*d.* a day extra.

When a pensioner, who is an old seaman or marine, has attained his 55th year, he is entitled to the GREENWICH-AGE-PENSION, in addition to his regular allowance; this amounts to 5*d.* a day at the age of 55, if he has been in receipt of his pension for 5 years, and to 9*d.* a day at the age of 65, if he has been in receipt of his naval pension for 10 years. The grant of these pensions rests entirely with the Admiralty and depends on the number of vacancies and the means at their disposal.

There exists also a limited number of SPECIAL PENSIONS (retired pay) for disabled officers of long sea service, the limit for a captain being a minimum of 15 years, and for a commander of 12 years. There are 81 naval pensions, solely for naval officers, amounting to from £50 for a lieutenant to £80 for a post captain; also 142 Greenwich-Hospital-Pensions for officers of all categories, comprising 23 for naval officers amounting to £50 for a lieutenant up to £150 for an admiral, and 49 such pensions for warrant-officers of £25 to £35 a year. Moreover the Admiralty disposes of 33 GOOD SERVICE PENSIONS for superior officers and surgeons, comprising ten pensions of £300 a year for admirals, twelve of £150 a year each for post captains, three of £100 a year for medical officers, six of £200 a year for generals, and two of £150 a year each for colonels or lieutenant-colonels of the marines; all these pensions have been awarded.

Finally there are pensions for wounds received in service by officers without any limitation of number, distinction being made between wounds received in battle or otherwise. For the loss of an eye, or of a limb, or for being rendered unfit to earn his subsistence the following scale has been fixed.

Rank	In battle	Not in battle
Post Captain or Colonel	£300	£250
Commander	£260	£200
Lieutenant of more than eight years' service, or Major	£200	£150
Lieutenant of less than eight years' service or Captain	£100	£75
Sub-Lieutenant, lieutenant of the marines, and chief warrant officers	£70	£50
Warrant-officer or Midshipman	£50	£30
Naval cadet	£45	£25

If the officer loses more than one limb or eye, the amount of the pension is increased in proportion. At present such pensions are drawn by two admirals of the fleet, one admiral, eight rear-admirals, four post captains, nine commanders, five lieutenants, five medical officers, seven engineers, two paymasters, three warrant-officers, and six officers of the marines.

An officer wounded in battle, who does not retire, receives in addition to his pay an extra allowance of one year's pay, and the expenses incurred in the cure of his wound.

v. Greenwich Hospital.

The Institution long known by that name was first a Royal residence from the year 1300. In that palace Henry VIII. and his two daughters Queen Mary and Queen Elizabeth were born. Charles II. had it pulled down and a new building was erected in its place. In 1692 Queen Mary, the wife of William of Orange, had it converted into a hospital to receive the numerous seamen wounded and mutilated in the battle of La Hogue.

The first provision for disabled sailors had been made more than 100 years previously by Queen Elizabeth, when Hawkins was purser of the fleet. There were made weekly collections in all the parishes of the country and the amounts thus collected were placed in the "Chatham Chest" for that purpose. Subsequently, under James I., 6*d.* a month was deducted from every man's pay on board to form a fund for disabled mariners, but it seems that in that deeply corrupted time the payments into the fund were far from regular.

During the reign of Charles II. the sick and wounded were taken care of as much as possible in hospitals of their own native town or county;

but this kind of accommodation was most inadequate during the Second Dutch War; in 1665 there were, according to official reports, more than 5000 sick, wounded, and prisoners on hand in one single spot; these were suffering from want of necessaries, even of bread, and no permanent relief was afforded them. It was Queen Mary, who had the good fortune to immortalise her name by devoting the Royal palace of Greenwich to the reception of the thousands of wounded returning home from the glorious battle of La Hogue. After her death, in 1694, the building was enlarged to the dimensions which it has to this day. Government and private benefactors co-operated



Royal Naval College at Greenwich.

in richly and abundantly endowing the institution; in 1696 the regulation that 6*d.* a month be deducted from every man's wages on board was re-enacted by law, and confiscated estates, lapsed prize-moneys and fines were handed over to the hospital. Soon the building, large as it was, was unable to accommodate the number of invalids, and with the corruption that followed in the train of the long peace that ensued, gross abuses crept in; for example in 1742 no less than 899 inmates had to be expelled, an investigation having shown that they had been wrongfully admitted. In 1782 the hospital accommodated 2300 men, divided into quarters for boatswains and boatswain's mates; they wore a blue uniform, which was supplied them together with shoes and socks; they had free residence given them and abundant board, and 1/- a week pocket money. In the year 1712 a SCHOOL

was added to the hospital, in which 150 boys, sons of pensioners, who engaged to go to sea, were educated between the years of 11 and 16; these also wore a blue uniform. A second school then existing for 600 boarders was in 1829 incorporated with the hospital-school, and both together formed senior and junior sections of 400 boys each. In 1861 the senior school was abolished; the lower still exists and contains 1000 to 1100 pupils. Of these many enter the Royal navy, partly as seamen and partly as engine-room artificers; some are apprenticed to the mercantile navy. Sons of warrant officers, petty officers, and seamen of the navy and of the Naval Reserve, or of other sailors, who have lost their lives at sea, are alone entitled to admission in this school; they must be between 11 and 14 years old, of sound bodily health, and fit for a seafaring life; this latter point is ascertained by a careful medical examination. In addition to the regular school education all the boys are taught swimming and practical seamanship. On leaving school they join the Royal or mercantile navy. The 50 top boys may choose to work, according to their liking, either in the Royal navy or dockyard, or in the mercantile navy.

The girls' school at Greenwich having been abolished, the Admiralty provides for the education of 200 sailors' daughters by paying their school-fees in other schools.

The eagerness for admission to Greenwich hospital greatly diminished in the first half of this century; most men preferred a pension to free board, residence, and clothes at the hospital, as it enabled them to live in greater freedom with their friends and relatives at home. The Admiralty took that into account in 1865, and the result was that the hospital stood empty, and in 1869 it was finally closed. For four years the palace was unoccupied, containing only the sea-pictures in the painted hall and the relics; at last in 1873 the Royal Naval College was transferred there. Of Greenwich hospital, which for 170 years had been the refuge of all naval invalids, nothing is left but the fund, from which the above mentioned pensions are defrayed; the building however has retained its ancient name.

VI. EDUCATION AND TRAINING.

Up to the middle of the present century little provision was made for the education of common sailors, barring always the above named Greenwich Naval School. Very little school learning was expected of warrant officers and petty officers; barely more than was required to keep the lists and discharge the current duties of the service; the consequence was that with the very defective school system of those days a man able to write was a *rara avis* on board. But all this has greatly changed since the introduction of continuous service, and the systematic education of boys on a large scale. When a lad enters he is expected to have received an elementary education, and in the school-ships for boys, which are excellently equipped and managed, they are taught reading, writing, arithmetic, &c. in addition to their practical training, which naturally holds a pre-eminent position.

The education and training in the school-ships aims throughout at practical utility. They are each under the government of a Commander; only the original ship, the "Impregnable" at Devonport is commanded by a post captain, who is also Inspector of all the school-ships. In these institutions the boys are well cared for, and are trained from the very outset to be neat, truthful and strictly obedient. Knotting, splicing, &c., they are taught by skilful petty officers and others.

Every ship has, on which the boys are taught boarding exercise and sail-drill at least one lightly rigged drill-mast; of special advantage for their training in seamanship are the sailing brigs attached to the schools; their rigging is adapted to the strength and size of the boys; they manœuvre splendidly and they are kept so trim and tidy that it does a sailor's heart good to look at them. They are excellently adapted to rouse in the boys a *genuine sailor's spirit*, which *at all times has been, and ever will be, the decisive element in every navy.*

It is felt as a want, which will not be easily supplied, that this kind of education cannot be continued in future in sea-going school-ships as thoroughly as it ought to be; especially for ordinary seamen this want is felt, there being only one such school-ship in use for them.

Additional admirable training institutions for sailors are: at Ports-

mouth the school-ships "Excellent" for gunnery and "Vernon" for torpedo-practice; at Devonport the "Cambridge" for gunnery, and the "Defiance" for torpedo; and at Sheerness there is a gunnery-school fitted up on shore, and a torpedo-school is in prospect. The gunnery-school at Portsmouth is no longer conducted on board, but was transferred years ago to Whale Island; nevertheless the old name has been retained. All these schools are abundantly supplied with teaching staffs and all appliances; also with tenders and boats, and drill-ammunition; the torpedo-schools have for use a large number of torpedo-boats, mining launches, vedette boats, &c.

All *Able Seamen* are as much as possible expected to go through these schools; the more gifted and more skilful among them go through a course, which mainly practical, but to some extent also theoretical, lasts nearly a year, and raises the men far above the general average.

The men who go through an additional half-year's course and are trained for Instructors, may be regarded as thoroughly educated gunners or torpedo-experts. This minute and careful provision of the best teaching and training of men *in the use of both the main arms of a man-of-war* and of experienced *Instructors* is practical in every way, and in harmony with the principle universally enforced; that the men must be fitted to carry out the main purpose of a navy, which is *combat*; all other knowledge and skill is of value only in so far as it can be utilized in the employment and preservation of the ship. This is the sum-total of the technical education of the man.

The arrangements formerly made for the education and training of lads intending to become officers was, up to 1860, also very defective. The appointment of volunteers, or King's letter boys, or servants, or boys simply, as described above, proved very valueless. In the beginning of the last century the boys received some instruction on board by the schoolmaster in writing, mathematics, navigation, &c., but with such very poor results, that different plans had to be devised.

Accordingly a Naval College was opened in 1729 in Portsmouth dockyard for 40 boys of good family, of the ages of 13 to 16 years; they were taught writing, mathematics, navigation, survey, gunnery, fortification, French, drawing, and fencing; in the 2nd year the boys received moreover practical lessons in the yard by the master of naval construction, by the harbourmaster, and by a gunner. It seems that the institution was not very popular, but it was allowed to pro-

tract its existence till 1808, when it was re-organized and placed under the direction of Professor Inman, who had returned from a voyage of survey to Australia, and the number of branches of study was enlarged. This arrangement lasted another 30 years, but was abandoned in 1837 in favour of the educational system carried out to this day, by Naval Instructors.

Candidates for officers' posts in the Royal navy are now educated in the naval school, the "Britannia" at Dartmouth described above; she is the larger of two ships-of-the-line, fitted up for residence and school purposes. At the present moment the regulations are being modified; the age of entry is raised by a year, and the time on board is reduced from two years to 16 months, and instead of the two old ships a large college is to be built on shore. The numerous play-grounds and gymnasias will no doubt be retained, as well as the various kinds of boats and the sloop belonging to the institution. A sailing brig, like those for the ships' boys, would be a very useful addition.

The "Britannia" is commanded by an experienced captain, a member of the COUNCIL OF NAVAL EDUCATION, who is changed once every three years; the institution is under the direct government of the Admiralty. The staff consists, besides the senior officer, of five lieutenants, a chaplain, surgeons, and paymasters; and as *Instructors*, a naval engineer for the study of machinery, ten naval Instructors, and six teachers for other branches of study, such as natural science, English literature, French, and drawing. The Principal Instructor draws £841 a year; the Senior Officer £502 a year, the Second Naval Instructor £602 a year, and the 8 Junior Masters draw £490 each; all these are naval Instructors; the teachers for languages, drawing, &c., who are civilians, receive a salary of from £250 to £350 a year.

On entry the cadet must come supplied with a sea-chest containing the regulation uniform and appurtenances, linen, bedding, and the fifteen school books in use, besides Bible and prayer-book; also a box of mathematical instruments and a sextant; when at sea he must also have a telescope. Additional allowances from home are forbidden; the cadet must manage to be content with his pocket money. In addition to the pay of the captain the vote for the "Britannia" for the financial year 1898/99 amounted to £25,381.

Since 1873 the Greenwich ROYAL NAVAL COLLEGE has been located in the whilom Royal palace, and subsequent naval hospital at Greenwich. Nominally the First Lord of the Admiralty is its governor;

the President is a meritorious Senior Admiral, for whom this post, with free residence and a salary of £2000 a year, is a mere sinecure. The real management is in the hands of a so-called Assistant, who is a post captain, and of a Director of Studies, a scholar, both of whom have free residence, and in addition the captain draws £750, and the Director of Studies £1200 a year. They have under them a staff of 33 teachers of mathematics, navigation, nautical astronomy, meteorology, maritime survey, physics, chemistry, applied mechanics, fortification, naval architecture, marine engineering, drawing, and foreign languages; the laboratory employs a dozen assistants and so on. The headmasters and professors have a salary of £600 a year; one of the Naval Instructors, and the Chaplain are still better provided for; they draw, in addition to a honorarium of £100, a salary of £675; another naval Instructor receives inclusive of a honorarium of £160, a salary of £476, and the chief Instructor in engineering draws £650. The minimum salary of a teacher is £350; the honoraria range from £100 to £160.

For the financial year 1898/99 the vote for this college amounted to £39,026 inclusive of £200 for special courses; this sum includes examiners' fees and contingencies.

The Institution has to serve *various purposes*. Its primary task is to prepare students desirous of becoming sub-lieutenants for the officers' examination in navigation and pilotage; there are also held in the college nine-monthly courses of study for officers qualifying for gunnery and torpedo duties, as well as for young officers of the marine artillery and infantry; more advanced courses are given to candidates for higher engineers' posts, as well as for those qualifying for naval Constructors, and for future Naval Instructors; moreover there are held short courses for officers of the navy in the history of naval warfare, &c. These are probably the so called *special* courses; for naval history a lecturer is appointed, but not for tactics¹ and strategy, hygiene,² maritime law, and the law of nations.³ The officers of the English navy and army have thus no opportunity offered them for the scientific study of these important branches.

The number of students at this college is estimated at 101 naval

¹ They get much instruction in the actual handling of fleets and ships.

² The naval hospitals provide this; medical officers are allowed to walk the large civil hospitals on full pay.

³ These subjects are very variable; every nation makes national laws to suit ever altering circumstances. The translator.

officers, 23 officers of the marines, 22 aspirants for naval architecture and engineering construction, and 3 officers of the Indian navy; amounting to a total of 149 students, being 15 less than 12 years ago. In reality there are present to-day on the 18th of March 1898: 5 full pay captains, 7 half pay captains, 4 full pay commanders, 17 officers qualifying for gunnery lieutenants, 10 officers qualifying for torpedo lieutenants, 4 candidates for naval Instructors, 25 acting sub-lieutenants, 1 major and 1 captain of the marines, 32 second lieutenants of the Royal marine artillery, 24 second lieutenants of the Royal marine light infantry, 20 assistant and probationary assistant engineers, 3 probationary assistant constructors, and 2 lieutenants, and 1 sub-lieutenant of the Royal Indian Marine; in all 156 students, being an excess of 5 over the estimate, and an increase of 31 upon last year.

The TRAINING SCHOOL FOR ENGINEER STUDENTS at Keyham in the Devonport-Keyham dockyard is managed by a commander; at that institution the students pass through a five years' course on the theory and practice of naval engineering. The staff consists of only 8 persons, viz: Three naval engineers, one Head-master, and four assistant masters. The Head-master draws the highest salary, viz: £560, that of the others ranges from £250 to £350 a year. The lower staff numbers 54 persons, one half of whom are pensioners in attendance on the students. The total budget of the school amounts to £13,630. The number of students is estimated at 190 as compared with 164 of two years ago. The arrangements, courses of instruction, and examinations have already been given above.

In addition to all these there exist 7 DOCKYARD SCHOOLS, five at home, being one in each of the following ports: Portsmouth, Devonport, Chatham, Sheerness, and Pembroke for 712 apprentices and boys; and two abroad in Malta and Bermuda for 59 apprentices and 248 children of dockyard labourers.

The former are managed each by 1 to 3 naval school-masters, the head-masters drawing £350 to £400 a year; the latter each by five masters and mistresses. The budget for all seven schools amounts in round numbers to £3000.

The depôts for marines have each two BARRACK-SCHOOLS, one for bigger boys with 1 to 4 teachers, and one for little boys and girls with 6 to 10 masters and mistresses; the former accommodate about 1900 pupils, the latter 1600 boys and girls. The costs amount in round numbers to about £3350.

There remain yet to be mentioned the OBSERVATORIES at Greenwich and at the Cape; from the former the longitude at sea is counted, and both are maintained out of the budget for the navy. The expenses for Greenwich amount to £8100, and for the Cape to £4250; to these have yet to be added £330 for Greenwich, and £300 for the Cape for the construction of photographic charts of the heavens. Moreover there are the COMPASS AND CHRONOMETER SECTIONS, and the office for the NAUTICAL ALMANAC, the preliminary vademecum of all the manuals required by every navigator. Finally we have yet to mention two, albeit small, contributions for *Learned Societies*, being £300 for the ROYAL UNITED SERVICE INSTITUTION, and £250 for the INSTITUTION OF NAVAL ARCHITECTS. Both these societies have rendered and are rendering great service to the English navy by the papers read at their meetings, as well as by their publications. They stimulate the study of, and explain obscure points in, the domains of organisation, warfare, and technical skill; this is all the more important because there exists no military or technical High School for naval officers and engineers.

VII. UNIFORMS.

a. Historic.

UNIFORMS for both officers and men were introduced so late in the English navy, that with our¹ military notions we can hardly believe it. Officers' uniforms were not introduced till 1748, just before the Seven Years' War, and the men's uniform not till 1857 *after* the Crimean War. In all the great wars and battles, inclusive of Trafalgar, to which England owes her world-wide power, the men fought in very various, often gay, costumes.

Badges to distinguish friends from foes were, of course, customary even in the Middle Ages, such as for example the Cross of St. George—a red upright Cross in a white field. Just as the English wore this sign in the battles of Crecy and Poitiers in 1346 and 1356 in a large

¹ i. e. German. The translator.

shape in the front and on their back, so probably also did the seamen of the Cinque Ports at the same time; that they did so at the beginning of the 16th century can be proved. It was worn on their white cotton coats over the scutcheon of their native Port. It seems that *similarity* of dress had been customary in the *Royal* ships and in those of the Cinque Ports even in the 15th century, but no positive information has been handed down to us. In later times the most various and most peculiar costumes were in vogue; such as skyblue coats, gray jackets with red facings, scarlet jackets, &c.

b. For Officers.

Up to 1748 the dress of officers was regulated by fashion, and all patterns and colours were represented; the favourite combination was scarlet with blue facings, or blue with scarlet facings. In the 17th century admirals frequently wore suits of mail. The dress was generally regulated by the captain or commander of the squadron.

In 1745 the officers of a ship-of-the-line were all clad in gray mounted with silver, or with scarlet facings; but red coats were then customary, young officers on entering the Mediterranean buying them of the soldiers at Gibraltar and having them faced with black. At that time however the necessity of a settled costume began to be felt, and Admiral Anson, being one of the Lords of the Admiralty, took the matter in hand. The selection of colour, cut, and the preparation of sample suits took some years, but at last, in April of 1748, King George II. selected the UNIFORM FOR NAVAL OFFICERS. He decided in favour of blue with white facings according to a dress of the Duchess of Bedford, which a little while previously he had seen and liked in Hyde Park. Orders were issued accordingly to all commanding officers, and samples were exhibited at the Navy-Office and at the dockyards. Regulations in reference thereto were however not issued, and thus it happened that a considerable time elapsed ere the uniform, which was to be regarded as "full dress", was universally adopted. It consisted of a blue coat with white facings and embroidery for the Admirals, but without collar, in the place of which there was worn a lace-necktie, or lace-collar, and of a cocked hat, which had been in use for some time before. This uniform was in force for naval officers and cadets, but the rest of the ship's complement were bound by no regulations but such as the commanding officer chose to issue.

NAVAL OFFICERS



Lieutenant in white-mess-dress
Lieutenant in mess-dress
Lieutenant in half-dress
Naval cadet in evening-dress



Captain in uniform
Admiral of the Fleet in full dress
Inspector General of Hospitals in uniform
Honorary Physician to the Queen in uniform
Flag Lieutenant in frock coat dress
Lieutenant in white dress

In 1767 the regulations concerning the uniforms of naval officers were issued with some modifications by an Order in Council; anchor buttons, white trousers, and an "undress uniform" for the daily service, were introduced in 1774; in 1783 embroidered emblems of rank on the sleeve-facings of Admirals, and in 1787 uniforms were decreed also for warrant-officers. In 1795 EPAULETTES became obligatory, the English navy therein following in the wake of other nations, with whom they had been in use ever since 1780; the English epaulettes were of gold with bullions, and for an Admiral adorned with one, or two or three silver stars according to his rank,¹ a captain of more than 3 years' service had both epaulettes, but without any star; one of less than three years' service had only one epaulette on the right shoulder; a commanding officer of less rank had only one epaulette on the left shoulder, and the lieutenant had no epaulettes at all. This, together with a white waistcoat and breeches, was the uniform of naval officers up to 1812. The sword was worn by younger officers with a broad belt from the shoulder. Midshipmen began to wear a dirk, but it only became obligatory in 1856. Meanwhile in 1805, uniforms were fixed for surgeons also, and in 1807 for paymasters and sailmakers. Next there was prescribed for lieutenants one epaulette for the right shoulder, and buttons with anchor and crown.

The uniform underwent frequent modifications; for example from 1833 to 1843 red facings were prescribed instead of white. In 1837 the uniform for engineers was introduced. Up to 1846 the hat had always to be worn on shore; it was three-cornered for a long time, then it became two-cornered and worn breadthways on the head; afterwards in undress, the cap with gold band was allowed on shore. In 1856 a black band with badges indicating the rank was introduced instead of the gold band on the cap; midshipmen received the dirk.

c. For the Crews.

THE DRESS OF THE CREWS was to some extent influenced by the fact that ever since about 1600 the cloth and even ready-made clothes were sold by the paymasters on board ship. In 1706 the men were ordered to wear a uniform, viz: gray jackets with red facings, red

¹ At present the device on the epaulette of an Admiral of the fleet is: a crown, crossed batons, surrounded by a wreath of laurel, without star. The translator.

waistcoats and red trousers; but in 1740 green and blue woollen garments had come into use. A very peculiar piece of dress was adopted and stood its ground for centuries, a sort of small petticoat reaching down to the knee somewhat like the kilts of the Scotch Highlanders; it was worn as far back as the 14th century and remained in use down to the present 19th century. It was made of sailcloth, sometimes tarred, it protected the trousers and kept the men warm. Allied to this was a broad brimmed tarred hat also made of sailcloth, and called tarpaulin. These tarred garments suggested the good-natured nickname "Jack Tar", equivalent to "Blue jackets." The tarred hat was subjected to many changes of fashion; it remained in use from the middle of the 17th century down to 1780, when it was supplanted by soft hats or caps of fur or wool; after that a better sort of stiff glazed hat had been introduced and remained in use till a few years ago. About 1802 straw hats imported from the West Indies became fashionable.

About 1760 the garments in use were: blue jackets, long gay waistcoats, white knee breeches protected by the petticoat, blue stockings, shoes with buckles, gay neckcloths, and tarred hats.

Towards the end of the last century the men used frequently to wear red and blue striped trousers, waistcoats and shirts to match the jackets of blue wool or yellow nankin and sailcloth petticoats. About 1800 blue jackets and white trousers came into use, but new-comers used to continue wearing their civilian clothes, and the whim of the commanding officer exercised great influence. Occasionally a commander or captain would prescribe the men's clothes; for example, as late as 1840 the commanding officer of the frigate "Vernon" ordered his men to wear woollen blouses and shawls; another, blue and white striped jerseys, and a third in 1854 red shirts and gay caps. From of old it was the custom that the commanding officer regulated the clothes of the men of his gig; for example, after Anson's return from the circumnavigation of the world, which had brought him in large amounts of prize-money, his gig's crew wore scarlet jackets with silver badges on the sleeves, and blue silk waistcoats; as late as 1853 the commanding officer of the "Harlequin" ordered his gig's men to be dressed as harlequins. The UNIFORM OF THE CREWS similar to that in use at present was finally settled by regulation in 1857; in 1867 badges were added for seamen-gunners and Instructors, and in 1868 also for torpedo-men; the blue cloth jackets and stiff hats were abolished in 1891.

THE NAVY: VARIOUS



Officer's sword
in scabbard

Officer's sword
drawn

Midshipman's dirk



Full Dress sword-belt for flag-officers
and commodores



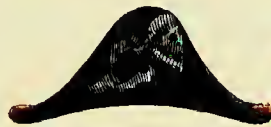
Full Dress sword-belt for Lieutenants



Sword-belt undress for all officers



Cocked hat for flag-officers



Cocked hat for all other officers



Officers' cap badge



Captains' and Commanders' cap



Tropical helmet



Sou'wester



Peak for flag-officers



Device for the epaulettes
of the Naval Reserve



Cap badge for officers
of the Naval Reserve



Belt-plate for officers
of the Naval Reserve



Device on cuff of officers
of the Naval Reserve



Shoulder strap
of the Naval Reserve

The men of the last century used to wear their HAIR full and long, and the pigtail which had become fashionable in the latter half of the century was not popular in the navy for any length of time, and had in 1826 completely disappeared.

Up to 1815 the officers use to shave their whole face, then long mutton-chop whiskers became fashionable, the chin in the middle being shaved to the width of about three fingers. Lately, thanks to the Duke of Edinboro' (of Coburg), full beards trimmed to a point, have been allowed, but not moustaches alone.

d. Modern Uniforms.

The present REGULATIONS concerning the UNIFORMS decree, that every man on board must wear the prescribed Uniform, which is:

A. Officers:

Dresses		Occasions
No. 1. "Full"	Full Dress Coat, Epaulettes, Laced trousers, Cocked hat, Sword, Full dress belt, Decorations and Medals.	a. State occasions at home and abroad. b. When receiving the Sovereign or other Crowned Heads. c. At ceremonies or entertainments at the discretion of the Senior Officer.
No. 2. "Ball".	Undress tail coat, Epaulettes, Laced trousers, White waistcoat, Decorations and Medals.	At official or public balls, dinners, and evening receptions.
No. 3. "Frock coat with epaulettes".	Frock coat, Epaulettes, Morning waistcoat, Trousers plain blue or white, Cocked hat, Sword, Undress belt, Ribbons of Decorations and Medals, Stars of Orders.	a. When receiving their Royal Highnesses, the Prince and Princess of Wales, Heirs to Thrones, or other Members of the English and of Foreign Royal Families; at Ports at home and abroad. All Masthead flags being hoisted. b. Courts-Martial. c. Funerals. d. Boarding foreign ships-of-war. e. Exchanging visits of ceremony with Foreign Officers or Functionaries.
No. 4. Frock coat".	Frock coat, Morning waistcoat, Trousers plain blue or white, Cap, Sword, Undress belt, Ribbons of Decorations and Medals, (Stars of Orders optional).	a. See a No. 3. All Masthead flags <i>not</i> being hoisted. b. Divisions on Sunday. c and d. Inspections by or visits to Commander-in-Chief or Senior Officer. e. Attending examina-

	Dresses	Occasions
No. 5. "Undress"	Undress coat, Morning waistcoat, Trousers, plain blue or white, Cap, Sword, Undress belt, Ribbons of Decorations and Medals.	tions. Surveys at hospitals. f. Officer of the Guard (exception see No. 3 (d). g. Ordinary occasions of duty and ceremony on shore. *¹ h. On leave in daytime, receptions in daytime, dances and entertainments on board and ashore in daytime. Receptions. * i. Sunday in harbour after divisions. * j. Officer of the watch in harbour (with sword belt). a. Drills and exercises with or without sword according to the nature of the drill or exercise. b. Patrol, dockyard duties, and landing parties. * c. Officers at Home Ports going to and from their residences. * d. On all other ordinary occasions afloat or in H. M. Dockyards.
No. 6. "Mess Dress".	Jacket, Evening waistcoat (blue), Laced trousers, Ribbons of Decorations and Medals, or Miniatures of ditto.	a. Dinner in Harbour at tables of Flag Officers and of Officers of corresponding rank, unless Ball dress is ordered. b. Evening dances and entertainments on shore and afloat. c. Dinner at Military mess, and entertainments given by Military Officers appearing in their Mess Dress.
No. 7. "Mess Undress"	Jacket, Evening waistcoat (blue), Plain blue trousers, Ribbons of Decorations, and Medals, or Ribbons of Miniature ditto.	a. Dinner at sea, at Flag Officers' tables, and in harbour, when guests are not entertained. b. Dinner at the tables of Captains and Officers in Command. Wardroom and Gun-room messes. c. Dinners at the messes of the Royal Naval Colleges, Barracks and Medical Establishments.
No. 8. "White Undress".	In Hot Climates. White undress coat, Shoulder straps, White trousers, Helmet	a. Occasions prescribed for No. 3. (b) and (c) <i>Note:—With Helmet.</i> b. Occasions prescribed for No. 4

¹ * indicates that swords are not to be worn, unless otherwise directed by the Senior Officer present.

NAVY: TAIL COATS, WAISTCOATS, AND TROUSERS



Full-dress coat for Flag Officers,
Commodores and Captains



Full-dress coat for Commanders
and Lieutenants



Undress Tail-coat for Officers
of all ranks



Front view of Full-dress coat
for Chief Gunner



Back view of Full-dress coat
for Chief Gunner



Morning waistcoat



Evening waistcoat



Evening waistcoat
for warrant officers



White Evening waistcoat



Gold-laced trousers



Plain trousers



White trousers

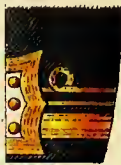
NAVY: DEVICES ON CUFFS



Admiral of the Fleet



Admiral



Vice-Admiral



Rear-Admiral and
Commodore 1st. Class



Commodore 2nd. Class



Captain



Commander



Lieutenant
of over 8 years'
service



Lieutenant
of under 8 years'
service



Sub-Lieutenant



Chief Gunner and
Chief Boatswain



Gunner and
Boatswain
of over 10 years'
service



Gunner and
Boatswain
of under 10 years'
service



Midshipman and
Naval Cadet



Inspector General
of Hospitals



Fleet Surgeon



Surgeon



Paymaster-in-chief



Staff-Paymaster
and Paymaster



Clerk and Assistant
Clerk



Chief Inspector
and Inspector
of Machinery



Staff and Chief
Engineer



Assistant Engineer



Naval Instructor
of 15 years'
service



Naval Instructor
of under 8 years'
service

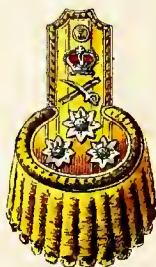


Full-dress collar for Officers

NAVY: EPAULETTES



Admiral of the Fleet



Admiral



Vice-Admiral



Rear-Admiral



Commodore 2nd. Class
and Captain
of over 8 years' service



Captain
of under 3 years' service



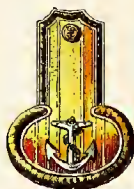
Commander



Lieutenant
of over 8 years' service



Lieutenant
of under 8 years'
service



Sub-Lieutenant



Staff-Commander



Inspector General
of Hospitals



Secretary to an Admiral
of the Fleet



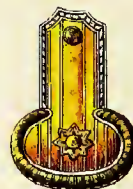
Inspector of Machinery
of under 8 years' service



Fleet Surgeon

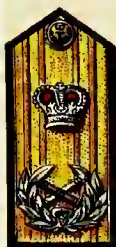


Naval Instructor
of 8 years' service



Chief Carpenter

NAVY: SHOULDER STRAPS



Admiral
of the Fleet



Admiral



Vice-Admiral



Rear-Admiral



Commodore
1st. Class



Commodore
2nd. Class



Captain



Commander



Lieutenant
of over 8 years'
service



Lieutenant
of under 8 years'
service



Sub-Lieutenant



Chief Quæser and
Chief Boatswain



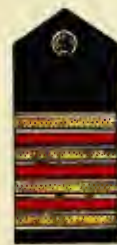
Quæser and
Boatswain
of over 10 years'
service



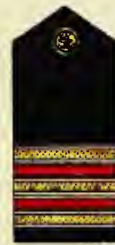
Quæser and
Boatswain
of under 10 years'
service



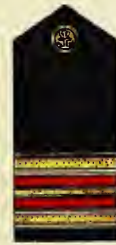
Inspector General
of Hospitals



Deputy Inspector
General
of Hospitals



Fleet Surgeon



Staff Surgeon



Surgeon



Inspector and
Chief Inspector
of Machinery



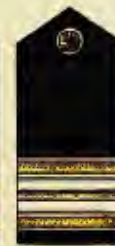
Fleet Engineer



Paymaster-in-chief



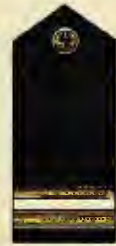
Fleet Paymaster



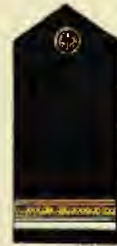
Staff Paymaster



Assistant
Paymaster
of 12 years'
service



Assistant
Paymaster
of 6 years'
service



Assistant
Paymaster
of under
6 years' service



Naval Instructor
of 15 years'
service

Dresses	Occasions
or cap (White cover), Sword, Undress belt, Ribbons of Decorations and Medals (optional).	(b) (c) (d) (e), and (f). c. Occasions prescribed for No. 4 (g), subject to order by Senior Officer present. d. Occasions prescribed for No. 5 (a) and (b). ✕ e. Occasions prescribed for No. 4, (h) (i) and (j). ✕ f. Occasions prescribed for No. 5 (d).

For further and more minute regulations see Navy List.

B. CREWS. a. In Sailors' Dress (Class II).

PETTY OFFICERS OF THE FIRST AND SECOND CLASS—SEAMEN—ARTIFICERS—STOKERS—BOYS and ALL OTHER RATINGS NOT SPECIALLY PROVIDED FOR.

The Regulation Kit for Petty Officers, and others above mentioned (Class II), is as follows, and is to be strictly adhered to.

Kit.

1 Monkey Jacket, 1 Jersey, 1 Comforter, 2 Pairs of Cloth Trousers, 2 Pairs ditto Serge, 4 pairs ditto Duck, 2 Jumpers Serge, 3 ditto Duck working, 2 ditto Duck with collar and bound, 2 Serge Frocks, 2 ditto Drill with Collars, 2 Check Shirts with short sleeves, 3 Flannels, 2 Pairs of Woollen Drawers, 2 Cholera Belts, 3 Collars Jean, 2 Pairs of Socks, 2 Black Silk Handkerchiefs, 2 Cloth Caps, 2 Cap Covers, 1 Sennet Hat, 1 Case for Sennet Hat, 2 Hat or Cap Ribbons, 2 Towels, 1 Type, 1 Pair of Half Boots, 1 Knife, 2 Knife Lanyards, 1 Bed, 1 Blanket, 2 Bed Covers, 1 Duck Bag for Brush, 1 Soap Bag, 1 Clothes Bag and Set of Combs, 1 Scrubbing Brush, 1 Clothes Brush, 1 Boot Brush for blacking, 1 ditto hard, 1 Ditty box, 24 Clothes Stops, 1 Housewife complete. The following are optional: 1 Waterproof coat, Sou'wester, and Leggings, 1 Pair of shoes of Uniform Pattern, 1 Cap Box, 1 Razor, 1 Pair of Scissors, 1 ditto Gloves, 1 ditto Mittens, 1 ditto Stockings.

The following are the contents of a "Housewife."

Beeswax 1 oz., 16 large metal Buttons, 6 small ditto, 16 stained bone ditto, 2 skeins white Cotton No. 24, 12 short needles, 12 darning ditto, $\frac{1}{2}$ oz. Pins, 1 piece (18 yards) $\frac{1}{2}$ inch white Tape, 1 piece

(9 yards) 1 inch white Tape, 2 pieces (8½ yards) ⅜ inch Dutch Tape, 1 tailor's Thimble, 25 skeins of whited brown thread, 25 ditto black, 2 oz. blue Worsted. (For Kits of other ratings and full descriptions of articles see Navy list.)

A newly entered Boy receives £5 to purchase his Kit of clothes, £1 for his bedding; on being promoted to the rank of First Class Boy he receives a further 50/- to complete his Kit of clothes; the full Kit of a Man costs about £13. 10. 0 and that of a Petty Officer about £20.

The several suits are worn as follows:

Petty Officers and Men, dressed as Seamen, Class II.			
	In temperate climates	In hot Climates	Occasions when worn
No. 1.	Serge frock, with gold badges, collars, and cloth trousers. (Mustering suit.)	White drill frocks and duck trousers.	At Inspections, Musters, Ceremonial occasions, and on Sundays in harbour.
No. 2.	Serge frock, with red badges, collars and cloth trousers.	Duck (bound) jumper with collar and duck trousers, or Serge jumper, collar and duck trousers. } as ordered	On leave on week days, on Sundays at sea. On working days, for all ordinary duties, i. e. usual drills, boat, and other ordinary work.
No. 3.	Serge jumper and trousers and collars.		
No. 4.	Serge jumper and trousers.	Serge jumper and trousers.	For night clothing and in wet weather.
No. 5.	White working jumper and duck trousers—check shirt and woollen drawers are to be worn in cold or wet weather—and jerseys, if being worn or especially ordered.	White working jumpers and duck trousers.	By working parties, when coaling, refitting, general cleaning of ship, and other extra-ordinary duties, when better clothing would be spoilt.

Sailors make their own clothes on board, or have them made there; which is mostly accomplished very satisfactorily. The materials are supplied with great accuracy by the victualling yards, and stores of them are always kept on board; as these are of the best quality, and sold better and cheaper than they could be purchased on shore, and in colour and substance accurately comply with the regulations, the men nearly without exception make their purchases on board.

b. Not in Sailor's Dress.

This concerns mostly the marines, whose uniforms are too complicated to be described here. In a few words it may be pointed out that in the uniform of *Artillery* officers helmet, coat, messjacket and trousers are *blue*; *Infantry* officers wear *scarlet* coat and messjacket and blue trousers; in the Tropics both arms are clad in white. The same colours are used by the privates, who receive their clothes ready made, as is done in the army. They receive a kit of clothes and other equipment when they first join the corps; afterwards there is issued to them a pair of trousers, boots, and a shirt once a year; three coats every two years, and a helmet and a greatcoat once every four years. If on a foreign station there happen to be no clothes in store the privates are credited, instead of clothes, with 30/—, the sergeants with £3.

The other men not clad as sailors are the police, sick-berth-staff, writers, stewards, cooks, domestics, and musicians; they do not wear serge frocks, but are clad in blue cloth jackets and waistcoats.

VIII. FLAGS.

History.

The National flag of the English War Navy is white, twice as long as it is broad, with the upright red cross of St. George, which divides the flag into 4 equal rectangles; the upper rectangle by the flag-staff has the Union-Jack, the symbol of the Union of the three Kingdoms, England, Scotland, and Ireland, by combining the three national crosses of St. George, St. Andrew, and St. Patrick. The Union-Jack was officially introduced by James I. in 1606, when Scotland and England were united; it differs somewhat from the present design, because the Cross of St. Patrick was absent, still it was the emblem of national Unity. The present design, which includes the Cross of St. Patrick, was adopted early in 1801 since the inclusion of Ireland in the United Kingdom. Since the year 1864 this white War-flag has been adopted to the exclusion of every other; it was already

partially in use in the early part of the century. The White Flag with the Cross of St. George (without the Union Jack of course) was the national flag of England as early as the Crusades, under Richard I. or Edward I., probably since the year 1274.

National Flags had at that time not yet become customary. *Flags of Command* or as marks of distinction to indicate the home ports are the more ancient flags. The ships of the Cinque Ports, for example, flew in remote times the flags of their respective ports, and these stood their ground till comparatively lately, when they were superseded by the flags of the dockyard ports. The symbols of command date probably from the early Middle Ages, when the knight on taking command of a ship attached a pennon to his lance, the baron a broad pendant, and the earl or the duke a flag. The Cross of St. George in the white field, as flag, pendant or pennon has, with a short interruption, been the emblem of command up to the present day. As far back as 1350 it was enacted by law, that this should be the NATIONAL FLAG OF ENGLAND. In the Middle Ages it flew on the Royal ships from the top of the only mast the ship had; the Royal Standard floated on the forecastle and the flag of the home port on a flagstaff at the stern. When ships with three masts came in, the flag of St. George still remained superior, viz: on the main mast, especially on the main mast of an Admiral's ship in the Narrow Seas, before which every foreign ship had to dip its flag, and lower its topsails. The Lord High Admiral, and he alone, flew the Royal Standard as emblem of his command. In 1606 James I. ordered that the new Union Jack, as the National Emblem, should fly from the main-mast of all merchantmen and men-of-war; English ships flying in addition the flag of St. George from the truck of the foremast; Scotch similarly the flag of St. Andrew; but as this led to some confusion and troubles, his son altered this regulation in 1634 and placed the Union Jack as a mark of distinction on the Royal war-ships alone. Some years before, in 1627, in a large expedition against France, the fleet was divided into three squadrons distinguished by red, blue, and white flags for centre, van, and rear respectively; flags, however, with the Cross of St. George in the upper field by the flagstaff (analogous to the modern Jack) were introduced for the first time in the Commonwealth for the three squadrons of the fleet: the red for the centre; the white (formerly the blue) for the van, and the blue (formerly the white) for the rear. (The white flag with the Cross of St. George was the National Flag for both merchantmen

NAVY: BADGES OF THE CREW



Petty Officer 1st Class



Petty Officer 2nd Class



Leading Seaman
and Shipwright



Gunnery instructor



Seaman-gunner
& torpedo-man



Seaman-gunner 1st Class



Seaman-gunner 2nd Class



Torpedo instructor



Leading torpedo-man



Signalling instructor



Qualified signalman



Signalman



Marksman's badge 1st Class



Marksman's badge 2nd Class



Marksman's badge 3rd Class



Gymnastic instructor



Chief Stoker and mechanic



Stoker



Armourer



Armourer's mate
and crew



Blacksmith, plumber,
painter 1st Class, carpenter's
mate and shipwright



All other artificers



Ship's police



Sick-Berth Staff



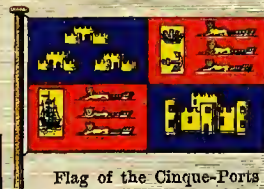
Good conduct badges

All these badges are embroidered in gold on cloth jackets and best blue serge tracks; on other serge in red worsted, and on white or working clothes in blue cotton. The first three, bars, hammers of rank and the good conduct badge on the left sleeve, all the other on the right sleeve.

NAVY: FLAGS



Admiralty flag



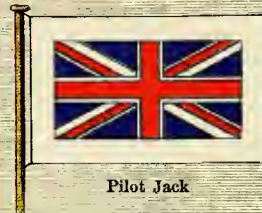
Flag of the Cinque-Ports



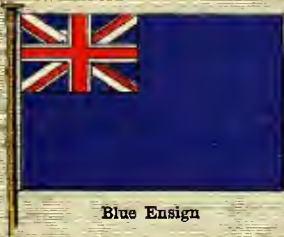
Union Jack



Royal Standard



Pilot Jack



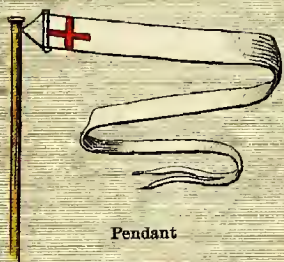
Blue Ensign



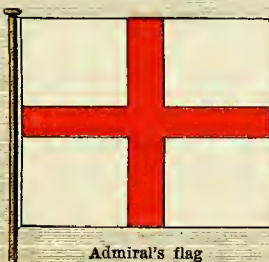
White Ensign for Royal Navy, &c.



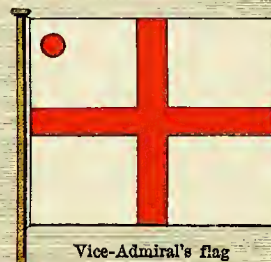
Red Ensign for Merchant Navy, &c.



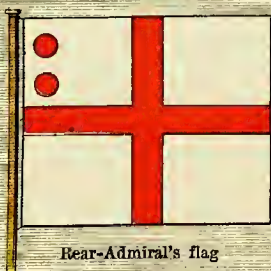
Pendant



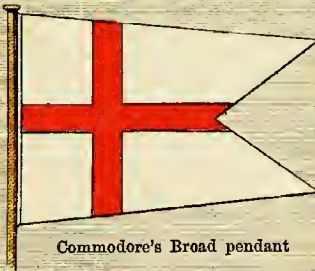
Admiral's flag



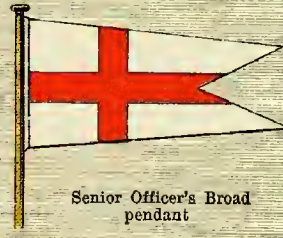
Vice-Admiral's flag



Rear-Admiral's flag



Commodore's Broad pendant



Senior Officer's Broad pendant

While this translation was going through the press these two flags have undergone an alteration. That of the rear-admiral carries the second ball in the quarter below that in which it is here shewn, and the diameter of the ball in either flag is half the depth of the quarter in which it is carried. A ball has been added to the upper quarter of the pendant of a commodore 2nd class.

and men-of-war.) Every squadron had three Admirals and by way of distinction they placed their flags at different mast-heads; the Admiral at that of the main-mast, the Vice-Admiral at that of the fore-mast, and the Rear-Admiral on the mizen-mast. But as the Admiral was Commander-in-Chief of the whole fleet, he flew as a special mark of distinction the Union Jack and not the Red Flag from the main-mast. These gradations applied also to the rating of the Admirals, so that there were up to 1864 Rear-Admirals, Vice-Admirals, and Admirals of the Blue, the White, and the Red, with the exception however (in consequence of the practice just named) that the Admiral of the Red, of the highest rank, flew the Union Jack, which did not become legal till 1805, when, after Trafalgar, it was bestowed on the Navy as a special mark of honour.

After the execution of Charles I. the Union Jack was altered, but at the Restoration it was re-instated. About that time and down to 1876 the captains of men-of-war flew as emblems of their command pendants, which had three stripes lengthways; blue, white, and red, terminating in one, or like a swallow-tail, in two points.

When in 1707 Scotland and England legally united formed the Kingdom of Great Britain, the white flag received the Cross of St. George with the Union Jack in the upper corner, which, with the exception of the alteration made in 1801 in the Union Jack, was the origin of the present war-flag. The Union Jack was now flown only exceptionally as the emblem of highest command; in the whole of the 18th century only three times; the last time by Admiral Howe in the Naval campaign, which ended with the glorious battle of the 1st of June 1794.¹

The white flag of St. George flew from all the English ships during the victorious battles of the Nile and of Trafalgar, and that was probably one of the reasons, why it was on the 5th of August 1864 made the sole national and command flag of England. As national flag it is oblong in form and carries the Union Jack in the upper corner near the flagstaff; as the command flag it is square-shaped without the Union Jack. Only the Admiral of the Fleet, who however now never goes afloat, carries the Union Jack at the main truck as his emblem of command.

On a three-masted vessel an Admiral carries his flag of command at the main-truck, the Vice-Admiral at the foretruck, and the Rear-

¹ The battle of Ushant, see p. 30.

Admiral at the mizen-truck. In vessels without any rigging the rank of the flag officer is indicated by the flag itself; the Rear-Admiral's flag has two red balls in the upper square near the flagstaff, the Vice-Admiral's one red ball, and the Admiral's has the simple cross without any balls. A Commodore of the First Class flies the broad swallow-tail pendant with the St. George's Cross from the main-truck; a Commodore of the Second Class flies the same flag from the fore-truck; a Senior Officer a similar, but smaller pendant from the mizen-mast. The Union Jack serves numerous purposes. Flying from the main-truck, as has already been said, it is the flag of command of the Admiral of the Fleet; from the fore-truck it indicates that the ship is entering the harbour or leaving it; from the mizen-truck that the ship is on guard-duty; from the peak that a court-martial is being held on board, and finally it is also used as a jack flying from a flag-staff on the bowsprit or stem-head on Sundays or festive occasions (see diagram of the flags).

The RED English flag—wholly red *with* the Union-Jack—once the flag of the highest rank—was made in 1864 the FLAG OF THE MERCANTILE NAVY; the BLUE flag—wholly blue *with* the Union-Jack—is flown by ships in the service of the state, or of the colonial governments, by chartered transports, or by subsidised steamers and the like; also by a number of ships, just now 53 in number, that are commanded by officers of the Naval Reserve with crews of the Naval Reserve on board, the right to fly the flag having been previously granted to them; such officers may then also fly a small blue pendant.

Merchant-men must, under penalties not exceeding £100, hoist the national flag on entering or leaving port, on meeting men-of-war, passing fortresses and so on; under similar penalties they are forbidden to fly flags, or pendants, &c. similar to or resembling those flown by men-of-war. Every captain of a man-of-war is authorized to keep watch over this and to lay an embargo on an offending vessel.

SIGNALLING with flags was practised in very early days; in England it is proved to have been in use in the 13th century; systematic signals were first introduced in 1655 by Admiral Penn; they were a very simple matter, being limited to flying the usual flags (blue, white, red) from different parts of the rigging. It remained at this simple stage down to the end of the last century, when Lord Hood in 1784 made an attempt to introduce a code of signals with special signal flags. This code was not adopted till 1793, after it had been also

extended to night signals and was called "LORD HOWE'S SIGNALS"; it was superseded in 1805 by a new CODE, that of POPHAM, which is the foundation of the one still in use. How defective it was is evident from the fact that although improvements had already been made, yet Nelson's famous signal; "England expects every man to do his duty" required 31 flags with 12 single signals, so that the signalling was not yet finished, when the "Victory" was already engaged.

Modern signalling and the signal books are kept secret by the English navy as by all other navies.

IX. SERVICE AND DISCIPLINE ON BOARD.

a. Historic.

The main duties of the service on board, such as watch-keeping, steering, keeping a look-out, &c. are discharged according to the ancient custom at sea, as it gradually took shape since the early Middle Ages and during the expansion of navigation by sails. These usages, based on the very nature of sea-navigation and recognized as valid by seafaring men, have been collated and recorded; for western seas in Oléron, an island on the west coast of France, and for the eastern seas in the Hanseatic town of Wisby in Gothland. These codifications of maritime regulations have formed the basis of judicial decisions and have thus acquired legal validity. The regulations of Oléron for the western seas were adopted in England also, probably in consequence of the marriage in 1152 of Henry II. with Eleanor of Guienne, which led to close relations between England and western France. They formed the principal basis for the enactments of the so called "BLACK BOOK" of the Admiralty, which was decisive for the Admiralty-Courts; they bore on the conduct of mariners in port, at sea, and in foreign waters. This highly important code, of which only one copy was in existence, had actually been lost towards the end of the 18th century; it had disappeared, as it seemed, be-

yond recovery. A substitute was compiled from different manuscripts, and legal awards were based on this compilation, but in 1874 the missing volume turned up; it was accidentally discovered in an old chest of books in the cellar of the Registration-office of the Admiralty-Court. It could now be proved that some of its regulations dated back to a time anterior to the reign of Edward III. who ascended the throne in 1327; the manuscript itself was however of a later date.

In addition to the Oléron regulations judicial awards were pronounced according to Orders in Council, or to former decisions of the Admiralty-Court, or to the sense of equity of the judges. This is the origin of the English maritime law, just as the English Common Law partly reaches back to prehistoric times. Skippers and sailmakers exercised jurisdiction on board; in them was vested the power to inflict the punishments, which were exceedingly stern. A murderer was tied to the body of his victim and thrown overboard alive. A stab with a knife, that drew blood was punished by the loss of one hand; for a blow with the hand the offender was dipped three times in the sea by a rope tied to the yard arm; a thief was landed in the nearest port, his head being tarred and feathered. The punishment for having fallen asleep when on the look-out, was that the delinquent was whipped naked in the presence of the whole crew and afterwards dipped three times in the sea; this latter punishment was also inflicted for disobedience, and if it occurred three times it involved the loss of wages and the eventual share in the freight.

On the other hand the skipper was bound in certain cases to consult the crew, as for example on going to sea in doubtful weather. Every man had to supply his own armour and arms and had to be ready to use them at need.

These regulations were valid for centuries both on board of merchantmen and of men-of-war; although their harshness was complained of, yet their disciplinary punishments such as dipping in the sea, keelhauling, fasting, whipping, &c., were retained till the end of the 17th century. In the year 1645 the Long Parliament instituted COURTS-MARTIAL for naval officers; the trial was to be 'protocolled and grave sentences had to obtain the sanction of the Admiralty. Soon after the Restoration the first ARTICLES OF WAR were formulated upon a motion in the House of Lords. In 1749, during Anson's time, their number rose to 36, and they mostly decreed a conditional or unconditional death-penalty and terminated with the phrase that

all crimes not punishable with the capital sentence should be dealt with according to the *ancient laws and regulations of the sea*; the disciplinary authority was still therefore very extensive. Under George II. the competence of courts-martial to reduce punishments was greatly enlarged; in all other respects the articles remained in force till 1847, when the naval Disciplinary Laws, known as the "ARTICLES OF WAR" were issued. Its preamble runs in the ancient 500 years old phrase, which is characteristic of England: "Whereas it is the NAVY, whereon, under the good Providence of God, the wealth, safety, and strength of the Kingdom chiefly depend, &c." This law, which has undergone repeated modifications together with the "Queen's Regulations and Admiralty Instructions", determines the regulation of the service and the maintenance of discipline on board.

As far back as the 17th century it was customary for Admirals in Command, with the consent of the Admiralty, to collate regulations and to give them legal force over the whole range of their command. In the year 1730 the Admiralty compiled and perfected these, had them printed under an Order in Council, and circulated them in the year following for the observance of the navy. This was the first edition of the "Royal Regulations, &c.", which has since been followed by others under constant enlargements, till the latest edition of 1893, which fills 1329 pages. The arrangement has remained unchanged, and as for the system and the general view afforded by the publication, there is room for improvement. New regulations are published from time to time in book form as "*Addenda*"; nevertheless, and in spite of the great bulk of the "Queen's Regulations and Admiralty Instructions" many additions have to be made and are published in the quarterly editions of the "Navy List" covering some 800 pages. The simple monthly "Navy Lists" merely publish alphabetical lists of names and seniority of officers, midshipmen, engineers, surgeons, superior officials, warrant-officers in active service, coast-guards, naval reserve, together with a complete list of all the vessels of the navy and their several staffs.

We see then that the service and disciplinary regulation developed very slowly and steadily, but *Life on Board* has undergone many changes. When, about the year 1500, broadside artillery was introduced ships grew larger and larger, but the number of guns was multiplied much faster and out of all proportion; it was a fault of the English navy for centuries that the ships were too heavily armed and loaded; thereby they suffered in seaworthiness and reduction of

speed, besides requiring a large increase in the ship's complement of men. In 1545 the "Mary Rose" foundered in the roadstead of Portsmouth; she was of 500 tons measurement, and, according to modern systems of measurement, she might perhaps be considered to have been of 750 tons displacement. Her crew numbered 700 men, being very nearly one man per ton, whilst modern battle-ships, such as for example the "Royal Sovereign", and the "Renown" have one man to every 20 tons. This disproportion changed, but only very gradually. The "Triumph" of 1578 was of 1100 tons measurement, and had a crew of 780 men. How these men slept, hammocks being as yet unknown and not introduced till 1597, seems to us moderns unimaginable. The first Threedecker, the "Sovereign of the Seas" of the year 1637 measured 1637 tons and had a crew of 800 men.

The crowding of the men on board was dreadful, and the space for stores very scanty; moreover the hold in the wooden ships could only be kept clean with difficulty or not at all, so that the water lodged there soon became stagnant and foul and poisoned the air; the interior wood of the ship quickly rotted; disinfection and ventilation were carried on in the most primitive manner; the foul drinking water only became fit for use after it had passed through this repulsive stage; the victuals, intended to last for months, were delivered in bad condition, the medical branch of the service was badly neglected down to the middle of the last century; the attendance on the sick left much to be desired, and preventive measures were not so much as thought of. All these circumstances, and much besides, led to such a state of things on board, that now-a-days we cannot conceive how the men could endure those sufferings, to our notions so inhuman and degrading. Evil consequences speedily ensued; scurvy and other painful diseases often raged on board and sometimes made havoc of the crews. Immediately after the defeat of the Armada, for example, disease and great mortality broke out in the English ships, and rendered them unfit for action; of a crew of 500 men in a certain ship 200 were swept off within 3 or 4 weeks, and no clearing out of the hold or primitive disinfecting was of any avail. Subsequently Admiral Blake himself died of scurvy.

On the occasion of Admiral Anson's voyage round the world, there were left at the end of the first year 1740/41 on board of the three surviving ships of the squadron only 335 men out of his total complements of 961, that is to say two thirds of his men had perished. Blockading squadrons outside Brest had more than once

been put *hors de combat* by disease, and had to return home. In the Seven Years' War the navy lost only 1512 seamen and marines in battle, but 133,708 men, that is 90 times as many by death from diseases and by desertion. The only remedy for scurvy then in use was beer, but with the abuses then rampant in the victualling department the beer supplied to the ships was often sour, spoilt, and unfit for use. The intentions in high quarters were good and the rations were abundant enough. In 1689 for example the men's daily rations consisted of $1\frac{1}{2}$ lb. of fresh bread or biscuit, 2 lbs. of fresh or salt meat, and 1 gallon of beer; and 8 oz. of butter and cheese every month besides; in the year 1622 the daily rations were 1 lb. of biscuits and 1 gallon of beer; 4 days in the week the men received 2 lbs. of salt beef or 1 lb. of pork with peas, and 3 days in the week haddock, and 2 oz. of butter and 4 oz. of cheese; but the Contract and Purchase Department of those days was badly organized and corruptibility of men in high posts was no rarity. Down to the early thirties of the present century beer was used as a remedy against scurvy, although lemon-juice was known in 1795 to be a very efficacious anti-scorbutic, which had largely reduced the number of deaths from that malady. Of rum, at first served out neat, each received nearly 1 pint a day,—too large a ration, which must have produced a bad effect; but since 1740 it was half mixed with water, and received the name of "GROG"; later on the ration was diminished in quantity and when in 1824 tea was served out the evening grog was abolished, and afterwards the men were allowed to receive money in lieu of the grog they had declined. From 1815 the water no longer was stored in wooden casks, where it became foul, but in iron tanks.

From the above it is obvious that in bygone centuries the seaman's calling was far more than that of the soldier "a rough and violent trade"¹ roughness, if not rudeness being inseparable from it. If moreover it is taken into consideration, what elements of the populace the press-gang had driven on board, and what were the abuses that dogged its footsteps, it is clear that a rigorous, nay at times even stern, discipline had to be enforced. Its chief instrument was the cat-o-nine-tails, which being inflicted not only by legal decision but also discretionally by an officer, was not rarely abused. The punishment was always dealt out in presence of the whole crew, and its

¹ Our author quotes here a well-known passage from Schiller's "Die Piccolomini". "Es ist der Krieg ein rauh gewaltsam Handwerk". The translator.

brutality brutalized the men still more. The complete irresponsibility of the commanding officer of a vessel sailing alone in the wide ocean, the absence of clear regulations and control, the want of all self-restraint and gentleness of disposition led at times to regrettable occurrences.

b. Present Circumstances.

During the last 50 years the mode of life on board has radically changed. More humane views have gained ground; by precise regulation of punishments, by careful watching over the administration of justice on board on the one hand, and by giving prizes and rewards for good conduct on the other hand, the organisation has been greatly improved; by the introduction of continuous service in all the branches, by education and training given to the boys, the character of the sailors has been completely altered; it is actuated by gentler motives and by the sense of a corporate existence. This is further aided by the respect paid to religion, and by the regulation that the crew are to hear the Word of God every day.

Like the complements of men, so the ships also have been completely altered during the last half century. The wooden sailing-vessels of former days were all very similar in structure, in internal arrangements, in armament, and in rigging; the smooth bore guns and their ammunition were of the simplest possible kind, and only the rigging required intelligent effort to understand, handle and keep in trim; to some extent like the modern engine, which however is not managed by sailors. The modern man-of-war is built of steel, without rigging, propelled only by steam, and equipped not merely with the ship's engines, but also with numerous other smaller contrivances for the most various purposes, some new and some formerly accomplished by the hand of man; every ship is more or less armoured, the engines, the rudder and the ammunition store-rooms being protected on all vessels; the guns are rifled breach-loaders on very complicated gun-carriages, and are no longer placed by the dozen in a single battery, but each is mounted separately behind its armour-clad shelter, and to all this is added that most difficult weapon the torpedo. Hardly one of these things has a counterpart in the ship of 50 years ago; nevertheless the service on board ship is essentially unchanged although the drill is very different, and the co-operation of the whole crew on the rigging and of a large part of it in battery drill has disappeared.

Formerly, when a ship was put in commission the captain, appointed by the Admiralty, received the mere ship's hull with bare lower masts, and he was only supplied with officers and warrant-officers. He had gradually to enlist his crew and to rig, equip, clean and paint his ship. Although this was to some extent instructive for him and his officers, yet it required three months or more ere the ship was ready to go to sea.

To-day the procedure is totally different. As has been explained above in the chapter on "Stations and Dockyards" the ships that are prepared for service, but are laid up in ordinary, are kept in readiness as a Fleet-Reserve in three great naval dockyards at home; they are fully equipped and have everything on board except ammunition and such victuals as would be spoilt by being kept; they are in charge of a crew with reduced numbers, are kept clean and in good trim, needing only that the bulk of the complement of men should go on board. The senior officers on half pay come from their several homes, the younger ones from the schoolships and other vessels, the T. M. men (Trained men) for gunnery and torpedoes from the corresponding schoolships, the engine-room artificers and stokers from the steam-reserves of the port, the other bluejackets from the guardship of the port or from the barracks, the boys from their schoolships, the marines are sent on board in a body from their divisions, cooks and domestics &c. are specially engaged—and in 24 hours the ship has its full complement on board.

The STAFF of a vessel, from a Second Class Cruiser upwards, comprises besides the captain, and executive officer, a navigating lieutenant, a gunnery lieutenant, and a torpedo expert (generally a lieutenant, but sometimes a gunner); every ship, however small, even a gunboat, has a navigating officer on board, torpedo-boat destroyers alone being without one.

The EXECUTIVE OFFICER now points out to every man his post and instructs him as to his duties, which is done by distribution of cards. The Watch-bill forms the basis for the organisation of the service; it rests on the ancient practice, that the crew divided into two halves take the watch by turns. To obviate the inconvenience of the same men having always the same watch, a daily alternation is effected by dividing the day, not into six, but into seven watches, by breaking up the hours from 4 to 8 in the afternoon into two-hourly watches, viz: 4 to 6 and 6 to 8. In England these watches are designated as the first and second dog-watches, a term applied

by the Germans to the night watches, from midnight till 4 a. m. Every half-hour of the watch is indicated by sounding the ship's bell in continuous number, so that the "Eight bells" indicates the end and relief of the watch,

The two halves of the Crew are designated as "*Starboard and Port Watches*" from the two sides of the ship, the Starboard, or the righthand side and the Port or the left hand side of the ship (looking from aft forward). By the Watch-bill the men are numbered consecutively, the starboard-men having odd, the port-men even numbers. Every man's number applies to all his posts, his sleeping place, and his hammock. Formerly the classification of the crew for working the sails was connected with this system; the men were divided into forecastle, foretop, maintop, mizentop or after guard on both sides of the ship; but with the disappearance of the rigging this classification has been abandoned. The arrangement that marines, stokers, and artificers should remain in compact bodies in the watch-bills has been retained, and they also sleep together and have their separate messes. As badges of their different watches the bluejackets wear a stripe¹ on their right or left arm, being red on a blue material and blue on white or working clothes. Every watch is divided into two halves, the first and second; every half is subdivided into quarters, so that if any work has to be done the whole complement, or a needful part of it, may be called up.

The distribution of the men in the boats is also regulated according to the above classification—the starboard watch take their seat on the starboard benches and work the starboard oars; the port watch those of the port. If a boat has to be sent off, its complement of men is drawn from the several sections, to prevent any one watch being too largely reduced. The larger boats, such as launches and pinnaces, are manned by older men; cutters and gigs by young men, and the smallest, jollies and dingies, by boys.

By the numbers of the watch-bill the sleeping places also are regulated, as they are written up near the hammock-hooks fixed in the beams. The boatswains' places are near the hatchways, to enable them to come on deck quickly; the marine watches sleep in a separate place; and so do the men undergoing punishment as well as the duty boat's crew in harbour. The sleeping places on the airy decks are far and away the best, as every square foot of the limited space has

¹ Recently abolished, except for boys in training ships. The translator.

to be utilized, and a man's hammock has often only 1 ft. 3 in. to 1 ft. 6 in. breadth allowed to it. This crowding of the men renders the air so close, and at times offensive, that breathing becomes difficult. This is specially felt in bad weather, when the hatchways of the upper deck have to be shut down, although one watch remains then on deck and does not occupy its hammocks.

In the service of alternate watches, "watch and watch" as it is called, only a part of the men on board is employed; the men who are at work all day, such as cooks, artificers, &c. being exempted from this duty; they are called "daymen" or sneeringly "idlers",¹ simply because they may sleep all night through and regardless of their being well occupied all day.

The mess tables also are occupied in accordance with the watch-bill. These tables are moveable and usually triced up (suspended) between the beams; when wanted they are lowered to the usual height of a dinner table; the benches are similarly triced up and put in position, when wanted. The men may within limits choose their own mess, but every mess must consist of halves of the two watches, and the daymen must be equally distributed over all the messes. It is the business of the master-at-arms to see to this. When all is arranged the list of the mess is made out accordingly.

The QUARTER-BILL, that is the distribution of the men among the guns, is settled by the *gunnery officer* on the principle that starboard guns are served by starboard watch, port guns by port men. The S. G. (Seamen-Gunners) take numbers 1 and 2; next come the T. M. (Trained men), &c. In the tops good marksmen are posted to work the quickfiring guns aloft. Among the men of every gun are some marines, but the marine Artillery work some guns of their own exclusively under their own officers. The midshipmen, sub-lieutenants, and lieutenants have suitable parts of the armament allotted to them. The sets of men for the several guns form the division; their lieutenant is answerable for their general appearance, bearing, and conduct. The gunner's-mates are stationed in the powder and shell magazines and the daymen are employed in carrying ammunition. A strong fire-brigade consisting of artificers and spare stokers, and commanded by a lieutenant, is stationed in the lower compartments; similarly a number of riggers is placed under a boatswain on the upper deck to make repairs. The men at the helm

¹ This term is falling into disuse for the reason here given. The translator.

and those engaged in sounding and signalling are under the command of the navigating officer, and they attend to the transport of the wounded.

One of the principal arrangements is the FIRE BILL; the men must be so distributed, that a fire breaking out in any part of the ship can be combatted at once with all the disposable means on board, and that the large boats can be immediately lowered to rescue the men in case of need.

Sentinels, with rifles loaded with ball cartridge, guard against intentional lowering of the smaller boats, or breaking into the spirit stores; the gunner stands ready under the command of the gunnery officer to flood the magazines; the engineer and his crew stand ready at the steam-pumps and so on.

When the men have all had their parts allotted to them, and the grouping into classes for conduct and leave being kept in sight, small arms, perishable and other provisions for the messes are taken on board, and ammunition is taken in in the stream¹ or roadstead and now the ship is ready for sea.

Now the gunnery officer issues the small arms to the men, selecting those suitable for boarding, for landing, and for manning the torpedo-boats. The landing party consists of marines and of blue-jackets armed with muskets and cutlasses, and formed into companies of infantry commanded by an officer; also of gunners for the field-guns, artificers to act as pioneers, stokers to act as ambulance men, men carrying reserve ammunition, and finally the guard boats which are manned by a coxwain and crew, and commanded by a sub-lieutenant.

According to the boat's watch-bill² used at landings, the landing party is distributed over all the boats in such a manner, that on every boat, even the smallest, some marines are stationed as marksmen. Each of the larger boats is armed with a 3 inch Nine-pounder, and these guns are used after landing as field-artillery. All this, as well as signal flags, biscuit, and drinking water, is always kept in readiness for immediate use.

The executive officer regulates among the crew the work of keeping the ship in good order and clean. Each deck is under the supervision of a separate officer; the cleaning of the several compartments

¹ With the modern ammunition this is generally now done in harbour in the stream.

² i. e. "Man and Arm Boats."

is entrusted to certain sections of men, so that men, whose duties in other respects are in the fore-castle should be employed in the fore-castle and so on. The boats, of which cutters are on duty in harbour by alternate watches, are to be kept in good order by their respective crews. Moreover the duties are distributed for the various manœuvres, such as anchoring and weighing anchor, clearing the deck for action and the like, and the men are practised each in his own particular duty; from every watch some men are selected to be on the look-out, and others to steer by day and by night; crews are set aside for the cutters to serve as life boats in case of danger, and these boats are at all times to be ready for immediate use, by being supplied with sailing gear, biscuit, and drinking water in quantities sufficient to last for some days.

Close attention is necessary for the wise distribution of the duties, and for watching over their accurate and punctual discharge. It requires insight into human character, close attention, incessant activity, and persistent practice of the men in their several branches of the service. The one purpose, to which every other must give way, is: *To keep the ship as much as possible ready and efficient for battle.* Months of uninterrupted drill and toil must be spent, ere this aim is adequately realised; every change in the *personnel*, especially of the officers, is detrimental. It may be regarded as a maxim that the longer a ship is in commission, the more efficient she becomes.

c. Service on Board.

The duties on board are regulated by daily and weekly routine pretty much the same in the ships of all navies in the world. They are carried out both in harbour and at sea, in foul weather or in fair, albeit that modifications are caused by, and the service is adapted to, temporary needs and circumstances. Prolonged changes are introduced only in the tropics on account of the heat.

The Daily Routine in the English navy is as follows:

A. M.

4. 30. Watch scrub and wash decks.

6. 0. Watch below and daymen lash up hammocks.

6. 15. Down mess tables and stools. Up hammocks.

6. 30. Breakfast.

7. 0. Quarters, clean guns.

7. 25. Secure guns.

7. 30. Watch clean wood and brass. Watch below clean 'tween-decks (particularly those where the men have breakfasted).
8. o. Hoist colours. Parade (i. e. Stand to attention and salute).
8. 15. Watch below clean and polish wood and brass.
8. 30. Shift into the dress of the day.
8. 45. Stow clothes-bags. Clean up mess decks and flats.
9. o. Muster. Prayers, conducted by captain in presence of the whole crew. Then watch fall in for exercise and morning drills.
11. 30. Clear up decks (end of drill).
11. 45. Down mess tables and stools (for dinner).
12. o. Dinner.
- P. M.
12. 30. Grog served out.
1. 10. Out pipes and smoking lanterns.
1. 15. Quarters clean guns. Clear up mess decks and flats. Watch fall in for afternoon drill.
4. o. Watch fall in; clear up decks (end of drill).
4. 15. Down mess tables and stools (for supper).
4. 30. Supper. Shift into night clothing.
5. o. Out pipes and smoking lanterns. Cooks clear up mess decks and flats. Clean arms.
5. 10. Muster. Coil down ropes; hoist boats.
7. 15. Watch and daymen down hammocks.
7. 30. Stand by hammocks.
8. 30. Stow clothes bags.
8. 45. Out pipes and smoking lanterns. Cooks clear up mess decks.
9. o. Rounds.
10. o. Out lights in junior officers' mess.
11. o. Out lights in officers' mess.

In the tropics the cooler hours of the morning and evening are more utilised and the dinner hour rest is correspondingly lengthened.

The Weekly Routine in Harbour.

Monday.

Forenoon. General drill. Prepare for action and rig out torpedo-nets.

Afternoon. Small-arm drill and gymnastics.

6 p. m. Wash clothes. Inspection of guns.

Tuesday.

- Forenoon. Scrub hammocks every other week. Torpedo exercise.
Drill by divisions.
- Afternoon. Boat sailing. Small-arm drill. Gymnastics.
Inspection of guns. Exercise manœuvres of steamboats.

Wednesday.

- Forenoon. Torpedo exercise. Out torpedo-nets. Field gun drill on shore if possible. Marines drill.
- Afternoon. Cutlass exercise. Inspection of mines, Electric Cables and circuits of guns. Midshipmen and boys at gun, small arm and cutlass drill.

Thursday.

- Forenoon. Exercise landing parties, ashore if possible. Drill in passing up ammunition. Test hydraulic machinery. Muster clothes and bedding.
- Afternoon. Make and mend clothes—smoking permitted.

Friday.

- Forenoon. General Quarters for action.
- Afternoon. Boat drill. Test gun cotton.

Saturday.

Clean ship.

One Monday in the month the bedding is aired on the ridge ropes and hammock nettings. Thursday is muster day twice a month for the whole complement of men to ascertain the numbers; once every two months to inspect bedding; once every three months general inspection of clothes. Once every quarter the Articles of War are read out and new regulations are made known. The captain examines the list of men recommended for promotion and so on; promotion is given solely to merit, to good performance and good conduct, which is indispensable. On Fridays at 9.30, "general quarters" is sounded, and the ship is cleared for action and drilled for an hour; in the afternoon the boats are armed or an anchor is laid out. On the last Friday in the month fire alarm is practised and on Saturday the pumps are tried. On Sundays the ship cleaning is limited to what is most necessary and indispensable; at 9.30 the captain holds muster by divisions, inspects the men, and the ship afterwards. Divine Service is held by the chaplain.

On a ship with well-trained crews the drill-practice proceeds rapidly and *silently* at the command of the captain; the other officers only give signs to the officers and men under them, mostly using small convenient flags for the purpose. The boatswain and his mates use their whistles on needful occasions, the bugler stands steady, watching the Commanding Officer to sound "still", whereupon every one stops and stands immovable till "carry on" is sounded, when drill is proceeded with, or a new order is carried out.

The crews are practised incessantly and their emulation is stimulated; cruising in a squadron, always preferable to independent cruising, offers excellent opportunity for this. Main stress is laid on gunnery practice, which is engaged in daily; the aim being to make every bluejacket a T. M.¹, not only in gunnery, but also in the use of all arms. Clear ship for action is practised as nearly as possible to represent reality, as though in presence of an imaginary enemy, or in repairing a supposed damage, &c. Once every three months target-practice is engaged in; one half of the ammunition allowed for that purpose may be expended in port, but the other half must be used at sea. Once a year prizes are competed for, the ship steaming past the target at full speed; all the guns take part, and good aim and rapidity of fire gain the prize; there are also prizes given for rifle practice. On sailing days the boats are assembled in a squadron by the flag-ship; they are separated in Divisions and practised by the flag-captain tactically and in signalling; the same is done with the steam-boats after the manner of a steam-squadron. Lowering and arming of boats and laying out anchor are also practised competitively. It is reported that on a certain ship the men lowered the three large boats without the aid of machinery in less than five minutes and replaced them in five minutes. The large steam pinnace is fitted up for torpedo work, and once every three months it engages in extensive operations, occasionally experimenting firing with the electric battery; once every six months a torpedo is exploded charged with 100lbs. of explosive materials. The squadron also practises laying of mines, the ships having spare mines on board for that purpose.

Much is done therefore to find a substitute for the rigging which has been abandoned, and which was an unrivalled means for the training of sailors. Efforts are also made to advance the education of the younger men by formal instruction, not however with very

¹ "Trained Man," see *supra*, page 209.

marked success, the men's time and energy being heavily taxed by the exigencies of the service. The schoolmaster keeps school for the boys and for such men as feel the want of schooling.

This seems the proper place for adding a few words on the employment of *Naval Brigades* which, owing to the wide distribution of English possessions over the whole globe and to the small wars incessantly waged, have frequently to be sent ashore to support the land forces, which are small in proportion, more especially when their position has become critical. An iron-clad can furnish 400 men, viz: about 200 bluejackets and 80 marines formed into 4 to 5 companies, two 3 inch guns, and one machine gun, making a total of 76 artillery men; to these are added 4 pioneers, 12 ambulance bearers, 17 men to carry reserve ammunition, 4 to carry medicines and surgical dressings and bandages, 3 armourers, 4 signalmen, 4 buglers, and 20 officers; in all 405 men, being about four sevenths of the ship's complement; a corvette furnishes in similar proportions 215 men. These parties are all fully equipped, carrying haversacks, gaiters, waterflasks, hats, puggarees, and a kind of knapsack, with which ships are now supplied.

According to this scale a squadron, as for example that of the Cape, would be able to send ashore a naval brigade of about 1460 men. In many small wars such forces have rendered excellent service; in Birmah in 1824 and 1852; in China in 1841, 1857, 1859, and 1860; in New Zealand in 1844, 1845, 1860, and 1862; subsequently also in Abyssinia, in Ashanti, in Zululand, and in Egypt. The "Shannon" and the "Pearl" Brigades earned great distinction in the Indian Mutiny. The former force advanced from Calcutta to Lucknow under the command of Captain Peel, a son of the eminent Premier; they brought up some heavy ship's artillery 68 pr. shell-guns, for which the artificers had first to build the gun carriages, and they took a prominent part in storming the town. It is seen then that by taking part in the wars on land the English Navy became an important factor in the maintenance and expansion of the British world-wide dominion.

d. The Provisions.

The DIETARY has been carefully considered, and the provisions are abundant; the articles supplied by the victualling yards are without exception of excellent quality and deserving of all praise, and great care is also taken to introduce variety in the preparation of the viands. The rations are calculated to supply the men's constitution with the needful elements in due proportions.

Scale of Victualling. (Seaman's full allowance). *Daily*: Biscuit $1\frac{1}{2}$ lbs. or soft bread $1\frac{1}{2}$ lbs., spirits $\frac{1}{8}$ pint, sugar 2 oz., chocolate 1 oz., or ditto soluble $1\frac{1}{2}$ oz., tea $\frac{1}{4}$ oz., when procurable, fresh meat 1 lb., vegetables $\frac{1}{2}$ lb.

Weekly: Oatmeal 3 oz., mustard $\frac{1}{2}$ oz., pepper $\frac{1}{4}$ oz., vinegar $\frac{1}{4}$ pint. When fresh provisions are not procurable: every other day: Salt pork 1 lb., split peas $\frac{1}{2}$ lb., celery seed $\frac{1}{2}$ oz. to every 8 lbs. of split peas put into the coppers; on one alternate day: Salt beef 1 lb., flour 9 oz., suet $\frac{3}{4}$ lb., raisins $1\frac{1}{2}$ oz.; on the other alternate day; Preserved meat $\frac{3}{4}$ lb., with either (1) preserved potatoes 4 oz., or (2) rice 4 oz., or: preserved potatoes 2 oz. plus rice 2 oz.; or: flour 9 oz., suet $\frac{3}{4}$ oz., raisins $1\frac{1}{2}$ oz. When it is necessary to issue substitutes, the equivalent proportions are regulated with great precision. The issue of spirits is managed with utmost care, and no spirits whatever are issued to persons under 20 years of age. After a fortnight's use of salt provisions lemon juice is issued. Lord George Hamilton calculated in 1892 the money-value of the ration to be $9\frac{3}{4}d$, this low figure is no doubt due to the purchases being made on a large scale and therefore at the lowest possible price; generally the ration is calculated at 1/-. There is a regulation, that, if a man does not draw in kind a part of the ration due to him, its value is paid him in cash as "savings"; this happens mainly with the grog, as the temperance movement in the fleet is gaining ground; of course, the men do not get the full value of the purchase money, the cashier deducting about $10\frac{0}{100}$ for expenses; thus a saving is effected, which Lord George Hamilton estimates at £45,000.

The man then receives for breakfast cocoa and bread, for supper tea and bread, at dinner *in port* daily fresh meat and soup with vegetables; once a week by way of change, salt pork with pea-soup; *at sea* alternately salt beef with plum pudding, and salt pork with pea-soup, and once a week preserved meat with preserved potatoes or rice.

At 12.30 p. m. the grog is served out, being half rum and half water. Mustard, vinegar, pepper, salt, and oatmeal are used for seasoning or accessories.

The grouping of men in messes has been explained above. The Master-at-arms, the School-master, and the Writers form a mess by themselves; similarly the *Chief and first class petty officers* and at times also the 2nd class petty officers; also the marines, stokers, and musicians; the boys are distributed over all the messes. Every mess has its

mess caterer, a Petty Officer or Leading Seaman; attendance—lowering the tables, placing the stools, fetching and serving the food, cleaning up the mess and table gear, replacing tables and stools—the men take by turn. The man in charge of the attendance curiously enough is called “cook of the mess,” although he has nothing to do with the cooking, which is attended to in the ship’s kitchen by the cook and his assistants.¹

The utensils for general use, such as bread-pans, vessels for grog, vinegar and water, for mustard, pepper, and salt, kettles for cocoa, tea, and soup, pans for pudding and baked meat as well as spoons, are supplied by the victualling yard, when the ship is put in commission. Then the members of each mess contribute to a common fund, which is administered by the mess caterer, who purchases drinking-vessels, dinner-service, &c., according to a pattern which is prescribed by the captain for the sake of uniformity. At the end of every² three months the mess caterer receives the savings from the paymaster. These amounts vary of course very greatly according to the number and the nature of the members of the mess and the ship’s station; a mess of 12 men, for example in the Channel Squadron, may save £6 a quarter, in the Mediterranean possibly £8, in the Pacific £7.10.0.; messes of 18 men obviously save correspondingly more. The money goes into the common fund of the mess; some save it all up and distribute the total, when the ship is paid off; others purchase delicacies, such as fruit, &c, but most commonly the men are particular in keeping their mess in fine style; the plates and the whole service are kept in such brilliant trim and condition that the mere sight of it is a gratification. And the men are proud of it, free hand being allowed them in this and in other matters pertaining to the mess to make their lives pleasant and comfortable. Strict discipline is however maintained in this matter also, extravagances are not permitted, and good manners are insisted on.

Articles in general use, such as soap and tobacco, the men can buy of the paymaster at a low price and of good quality. If there is room on board, and the Commanding Officer gives his consent, a canteen may be opened, but not for spirituous liquors; the Executive Officer is chairman of the board of managers, on which another Naval

¹ But the “cook of the mess” prepares the food up to the point, where it is handed over to the ship’s cook for cooking. The translator.

² Monthly, as a matter of fact. The translator.

Officer must also have a seat. The bye-laws of the canteen must be confirmed by the *Commander-in-Chief*.

One more word about the messes of Officers, &c. On every ship of large dimensions there are three such messes, independent of the captain, who takes his meals alone. (1) the officers' mess in the wardroom, comprising all the officers of the vessel down to the Lieutenant inclusive; also those surgeons, engineers, paymasters, chaplains, instructors, and officers of the marines, who hold equivalent ranks; (2) the sub-lieutenants, midshipmen, and officials of equivalent rank, form what might be called the mess of the subaltern officers in the gunroom; (3) the warrant-officers mess. The dinner-service &c for these messes is supplied by the victualling yard free of charge, when the ship is put in commission, and may be renewed after having been in use for three and a half years. For the supply of additional articles and of stores, the members of the two highest messes may have £3. 10. 0. per officer advanced to them. The mess is administered by a committee of 3 to 4 members, the senior executive officer being chairman. It is the duty of the captain to watch over the management of the messes and especially over the supply and consumption of wines and spirits. The mess-bills are to be settled by the members every month. The warrant-officers' mess is not allowed to keep a store of wine, but with the consent of the captain they may obtain it from the officers' mess.

All that concerns the Uniform and the clothing of the men has been explained under the head "Uniform."

LIBRARIES provide amusement for the men. As far back as the beginning of last century, the chaplains were wont to supply the men with good literature by the distribution of religious books and tracts; but these were unsubsidised, private efforts. In the year 1816 each of two officers on equipping his ship, proposed to the Woolwich dockyard of those days to supply the ship with an official library, and their proposal was accompanied by the offer of their own considerable collection of books. This movement received the support of the famous philanthropist Mrs. Elizabeth Fry, who had previously induced the Admiralty to furnish libraries to the naval hospitals and the coast-guards. Different benevolent societies also and private persons made contributions to ships' libraries, which in those days consisted principally of religious books. The supply of libraries on board ship was not conceded by the Admiralty till 1838; 24 years afterwards, in 1862, secular literature was allowed to take the place

of the books, which up to then had been mostly of a religious character, and it was left to the chaplains to furnish the required religious literature. Further changes were subsequently made principally in 1889, when the existing books were superseded by more attractive works. Finally in 1892 the long felt want of libraries for officers and on stations was supplied—the former contain principally valuable books of reference; the latter belong to a whole station and circulate on the ships of the corresponding squadron.

In consequence of these searching organic improvements, of the progress in science and in technical attainments, and of private and official efforts to improve the lot of sailors, their behaviour has during the last half century so largely altered for the better, that there is hardly any resemblance left to the state of things of former days. Men on leave of absence from an English man-of-war used to be an object of terror to the port they happened to visit; they were guilty of the rudest and most repulsive excesses, but now-a-days their conduct is that of orderly and well-behaved members of society. This is especially true on board, both on duty and off duty; and this is dictated to them by their own interest, as they are perfectly well aware, that *good conduct is the indispensable condition of promotion*, and that this is moreover rewarded by good conduct badges and by increase of pay. By good conduct alone the man can make sure of a good income and a satisfactory pension. This they are all the more anxious to secure, because most of them marry early, and—which is another strong contrast to former days—mostly respectable girls, with whom they live in happy and honourable wedlock. An experienced English naval officer draws attention to the surprising fact that, in the applications for retirement after service of 12 or 22 years, the men as a rule have certificates of “very good” conduct. The enforcement of discipline has consequently changed altogether in character.

e. Discipline on Board

is regulated mainly by the provisions of the NAVAL DISCIPLINE ACT of 1866, the first section of which contains the ARTICLES OF WAR, which are exhibited in a prominent place in every ship, and are read out to every man on board once every three months. The first Article refers to Divine Service, which is to be held, according to the liturgy of the Church of England, solemnly, orderly, and reverently;

the Sunday is to be observed by Divine Service and by abstention from all work that is not indispensable; every morning a short prayer is to be offered after muster.

Next the articles of war deal with the punishments for bad conduct in presence of the enemy, for not pursuing him when defeated, and so on; also for swearing, immorality, cruelty to subordinates, looting, and bad treatment of prisoners, and finally it is decreed, that all offences against naval discipline, not expressly enumerated, should be punished according to *Maritime Law and Usage*.

The *legal* punishments are: Death, Penal Servitude, Discharge from the service with disgrace, Imprisonment for a period not exceeding two years, Corporal punishment up to 48 strokes, Discharge from the service, in the case of officers Loss of seniority for a certain period, Discharge from the ship, grave or simple Reprimand, Degradation to a lower rank in the case of subaltern and petty officers, Loss of pay, pension, medals, &c., and with deserters also of clothes, &c. To these are yet to be added disciplinary punishments

A COURT-MARTIAL can be instituted by a Commander-in-Chief, or, if at least three ships are assembled, by the Senior Officer on the spot; this latter must after previous careful examination be convinced that there is a *prima facie* case for a searching investigation of the charge, which must be made in writing. He then appoints the officers to serve as judges, and the president of the court, who is responsible for the due conduct of the proceedings. The accused is treated as a prisoner and brought before the court; he must receive a copy of the charge at least 24 hours before the assembling of the court; he may choose a counsel for his defence, or he may plead himself; he may call what witnesses he likes and freely conduct his case before the court. As a rule, the prosecutor is he who moved for the appointment of a court-martial. When the court meets, a gun is fired on board the ship, where the meeting is held, and the Union Jack is hoisted at the spanker gaff, where it flies till the court rises.

The case is heard in public; witnesses are examined and cross-examined exactly as in a civil suit; after the prisoner has been removed and the court has considered the case, the verdict is given, the youngest officer present voting first. Then the accused is again brought in, and is told his sentence, which the president must forthwith report to the convening officer, who has to subject it to a rigorous re-examination. If corporal punishment is awarded, the sentence requires the consent of the Admiralty, before it is carried out.

The DISCIPLINARY PUNISHMENTS are of far greater importance for the regulation of the service and the maintenance of discipline than the courts-martial, which occur but rarely. These disciplinary punishments are: Discharge from the service with disgrace, simple discharge, corporal punishment not exceeding 25 strokes; for desertion and other crimes imprisonment for a period not exceeding three months, reduction to the ranks (for which special regulations exist), loss of good conduct badges and medals, transfer into the second class for conduct, confinement in cells, deprivation of grog, and taking meals under the supervision of a sentry coupled with punitive work, or standing on deck during non-working time for a period not exceeding a fortnight, deprivation of grog and at dinner time standing on deck for a period not exceeding a week, stoppage of leave of absence for a period not exceeding three months, deduction from pay for absence without leave, or for drunkenness deprivation of grog for a period not exceeding 30 days, removal to a lower class for leave of absence, carrying hammock or clothes bag for an hour daily for no more than three days, reprimand by the captain, extra turn of lee wheel, or standing on deck on the look-out, for not more than two hours; marines to mount punishment guard for a period not exceeding seven days, boys to receive 24 strokes with the birch on their bare breech or 12 strokes with the cane over their trousers.

The penalties to be inflicted for the various acts of misdemeanor are regulated with great care; thus: discharge with disgrace for indecent assaults, &c, also for mutiny, theft, concealing or misusing the royal stores or money, and for maliciously charging others with these misdeeds. In most cases several punishments may be combined, for example leave of absence may be withheld and deductions made from pay as well; or privation of grog may be added to reduction to a lower class for leave; or reduction to the second class for conduct may be joined to the same penalties and to arrest as well, with extra work, and withdrawal of leave of absence. Disciplinary penalties thus gain considerable enlargement, but on the other hand they are limited by strict regulations which determine with accuracy the penalties to be inflicted for the various kinds of misconduct. For some cases this has already been mentioned above, and exceptions are made for petty officers and leading seamen. Corporal punishment can only be inflicted for mutiny and for assaulting superior officers, and this is moreover so restricted by special regulations, that it hardly occurs except with boys. The sterner punishments, excepting discharge,

can only be awarded upon a charge made in writing and in presence of an officer higher in command, who must give his consent; all punishments are awarded only after minute, calm investigation and never in haste. Punishments are awarded by the Captain alone, but he may delegate a portion of his authority to the executive officer, and for marines to the officer of marines. As regards the *execution* of the punishments, the Sunday is to be as much as possible kept free from it, irons and handcuffs are to be avoided as much as possible, the gag is forbidden, as well as locking men up in the coal-bunkers. The punishments are all to be entered by the captain in the punishment register, and a return is to be sent in once every three months; that of grave penalties is forwarded to the Admiralty.¹

As disciplinary *measures* are to be mentioned: the divisions of the men into two classes of conduct, every man's class being determined by his certificate from the previous ship; moreover the men are grouped into four classes for leave of absence; 1st for special leave; 2nd for privileged leave; 3rd for general leave; 4th for habitual leave breakers.² The first class comprises the petty officers, they leave about 6 p.m. or earlier, and if they are off duty, they need not return before 6 a.m. The men of the second class have leave of absence granted them generally twice a week, those of the third twice a month, those of the fourth only with the consent of the captain, but at least once every three months. For the boys there are no classes of conduct or of leave; they are never allowed to stay away the night and only get leave of absence in the afternoon and as a rule not at the same time as the men. Six months good conduct entitles a man to promotion into a higher leave of absence class. Leave of absence being generally conceded as liberally as possible, leave breaking is punished by the heaviest deductions from pay.

The following are THE STATISTICS OF DISCIPLINARY PUNISHMENTS for 1897: There have been held in all 153 court-martials, who condemned in all 151 individuals, viz: 51 on home stations, and 100 on foreign stations. The number of breaches of discipline thus expiated is considerably greater, amounting to 281; the most common were in 46 cases theft and embezzlement; then there were 97 cases of assault of a superior officer, 52 cases of wilful disobedience, 35 cases of

¹ As a matter of fact, the whole return is forwarded to the Admiralty. The translator.

² This System has been altered, whilst the book was going through the press.
The translator.

disrespect shewn to superior officers, 25 cases of threatening an officer, &c. Desertion no more than 16 cases, drunkenness only 6 cases, mutiny, swearing and shamming illness not at all. Of the 154 defendants, 3 were found not guilty, one was condemned to penal servitude, 87 to imprisonment and discharge with disgrace, or simple discharge, 57 to imprisonment with hard labour, 3 to disrating; the death-penalty and corporal punishment were not inflicted at all. With all the men it had been their first case. As there were 106,309 men on board, these numbers must be regarded as highly favourable; the cases of misconduct have ever since 1885, if not steadily yet on the whole diminished in *absolute* number, still more *relatively*, seeing that the *personnel* of the navy has risen from less than 50,000 to more than 100,000, that is by more than 50%.

The number of *Disciplinary Punishments* amounted in the same year to 45,148 on home stations and 44,500 on foreign stations, being 89,648 in all, but the bulk of them viz: 81,663, or more than 91% were trifling affairs.

Discharge with disgrace was inflicted on 7 persons, simple discharge on 196 persons, 1731 were sent to prison, 461 were disrated, and 5323 were confined in cells, and finally 60 boys were caned, but other corporal punishment did not occur.

The sentences by court-martial are in strange contrast with the mere disciplinary punishments. Of the former the sentences on foreign stations were nearly twice as numerous as those on home stations; of the latter the numbers were reversed; surprising is the great number of imprisonments viz: 990, and of cells viz. 2981 at home, whilst abroad they were only 741 and 2342 respectively. On the whole the proportion is less than one disciplinary punishment per man per year, and this has remained pretty constant since 1885, and the last 4 years were still more favourable.

Of the regulations for the maintenance of discipline on board it may yet be mentioned, that duelling and challenging to a duel is strictly forbidden; that it is forbidden to accept gratuities, which are of universal occurrence in semi-civilized countries; that women are not allowed on board, or only if permission has been previously obtained from the Admiralty; and that the sale of spirituous liquor on board is wholly forbidden. Great importance is attached to the regulation that Superiors should at all times and in all circumstances be treated with the deference due to them.

f. Hygiene.

As in every other respect, so also in the matter of HYGIENE the men are carefully looked after; first by careful medical examination of the men on being appointed, then again, when they go on board; next by watchful attention to their food, clothing, and occupations in the discharge of their duties; for example in hot or wet weather, and finally also by direct hygienic regulations such as thorough ventilation of the rooms, washing, bathing, and liberal equipment of hospitals and dispensaries. The state of health on board naturally varies with the healthiness of the several stations, but it is good on the whole. In the year 1891,¹ of 55,670 persons 52,866, or 95% were under medical treatment. Of these 27,200 persons distributed over 85 ships, &c. were on home stations, and only 20,265 or 74.5% came under medical treatment; a very gratifying result especially considering that this number included 1913 cases of influenza. The number of deaths was only 124 (4.55 per thousand); a very small number. Far less favourable was the result in the Mediterranean station, where the proportion of men under medical treatment was 120.3 per cent, and the number of deaths was 73 (8.44 per thousand), being almost double the proportion on the home stations. Much of this was due to the insanitary condition of the port of Malta, which has since then been somewhat ameliorated by shutting up unwholesome wells, &c. But on foreign stations young people who are not yet inured or seasoned are exposed to numerous dangers.

g. Conclusion.

On the whole then, the state of things in the English navy with respect to the bearing and conduct of the men, to their discipline and the care taken of them, has during the last fifty years been improved beyond recognition. The late Sir Alexander Milne, Admiral of the Fleet, who died at an advanced age not very long ago, more than anybody else contributed to secure this gratifying result. Already in the forties of this century, he, being one of the Lords of the Admiralty, introduced essential improvements in the life on board,

¹ Comparing these returns with those of 1896 (1897 not being yet published) the result is still more favourable; the cases under medical treatment being reduced to 91%, and this year's Report is "altogether the most satisfactory that has been furnished since 1856."

such as the distillation of drinking water, the institution of canteens on board, starting a school of cookery in Portsmouth, introducing good conduct badges with increase of pay, granting of pensions to warrant officers who up to then had only the workhouse to look to, the creation of the ranks of Chief Petty Officer and Leading seaman, raising the prize money, and granting the men salvage money, &c. We must also mention Admiral Sir W. Martin, who was Commander-in-Chief in the year 1859 in the Mediterranean; from his time dates the commencement of the excellent discipline of the present day.

The establishment on shore of various INSTITUTIONS, founded by PRIVATE CHARITABLE PERSONS in the great ports, for the accommodation of men on furlough or temporarily unemployed has proved a great benefit. The men are supplied with decent society and comfortable homes at a very low charge. Such are: the Royal Sailors' Home in Portsmouth, founded by three naval officers in 1850, and the three houses in Portsmouth and Devonport, called the Royal Sailors' Rest, which owe their existence to the devoted, philanthropic, and self-sacrificing energy of Miss Weston. The former has 352, the Royal Sailors' Rest has 350 small rooms fitted up like ships cabins for the night's shelter. The meals are good and cheap, excellent baths are provided, as well games and good literature. In the chapel attached to the building Miss Weston, supported by numerous assistants of both sexes, holds prayer-meetings to which everybody has free access; moreover she publishes every month a letter adapted to the men's mode of thought, of which more than half a million copies circulate in all the ships of the Royal Navy, and in numerous ships of the mercantile fleet. The same holds good of a very full and well-edited illustrated paper, published by a lady friend of Miss Weston. These highly beneficent institutions are self-supporting; they are so popular and so much frequented that they have continually to be enlarged. Sailors' Missions too, and the Temperance movement are meeting with ever increasing success. In almost every man-of-war there is a branch of the Temperance Union, a matter of no small importance considering the previous prevalence of intemperance all over the country, and especially in the naval ports.

All these endeavours have proved highly profitable to the country, but the radical change for the better that has taken place is no doubt to be ascribed to the introduction of continuous service, and to the recruiting of sailors by boys trained for a sea-faring life in school ships; two systems which must be the envy of every navy not pos-

sessing them. In the present day, when the requirements of a sailor are so much higher than they were in former days, long service is indispensable both to give the man the needful training, to keep him up to the highest level of efficiency when trained, and fully to utilize his powers in the service of the country.

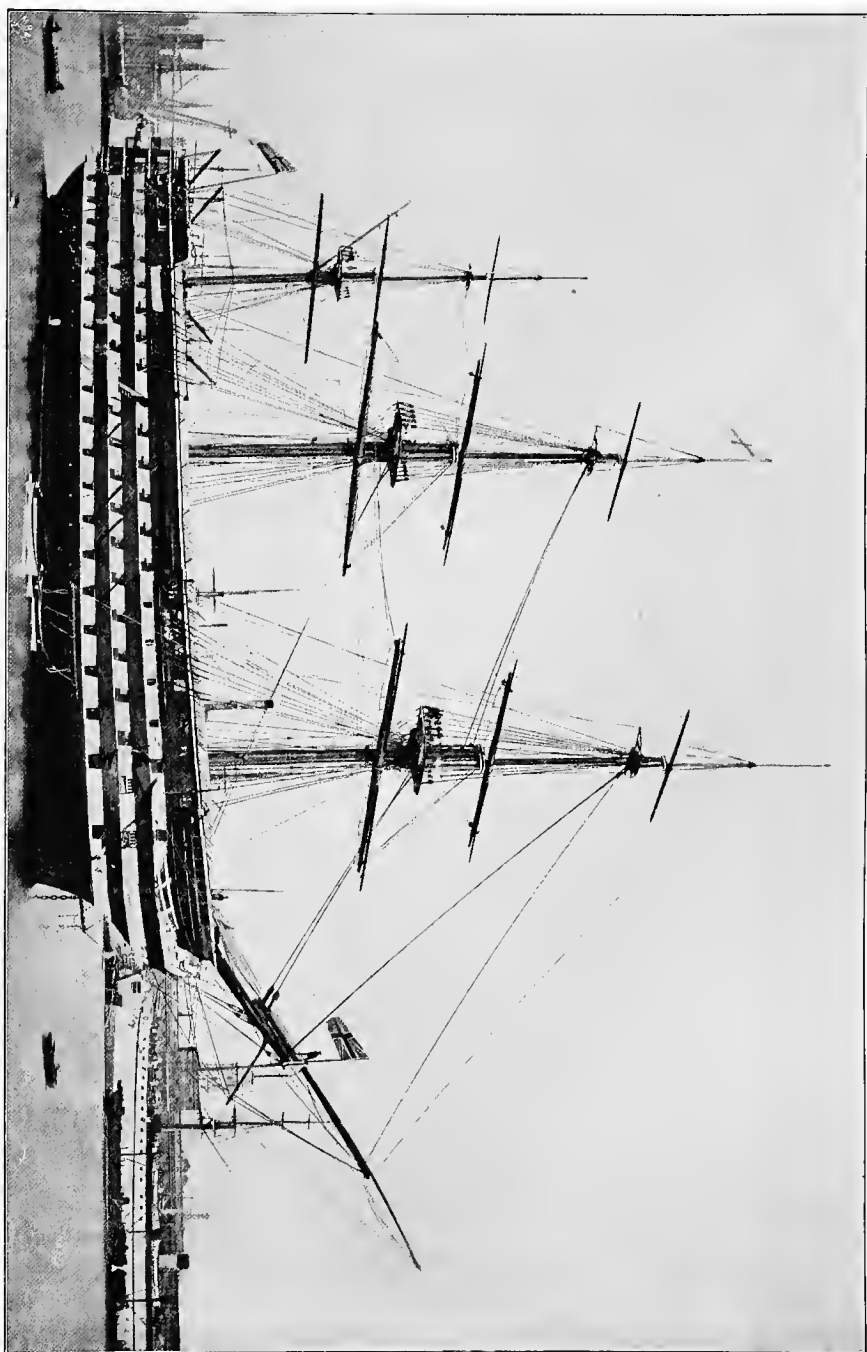
X. MATERIAL.

A. Ships.

I. HISTORIC DEVELOPMENT.

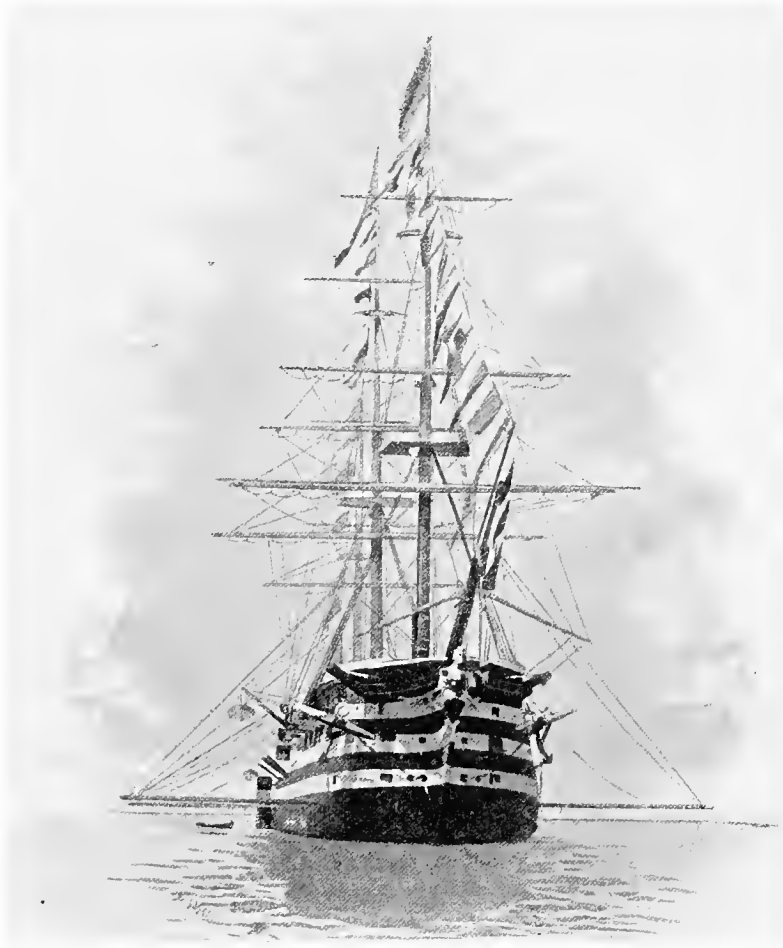
The theory of Naval Architecture has not even yet reached its final stage. In the last century the subject was not even discussed in the English navy, as the English at all times have been and to some extent still are, adverse to theory. It is quite true that James I. had founded the "SHIPWRIGHTS' COMPANY" under the management of PHINEAS PETT, the architect of the "Sovereign of the Seas", but it seems that in the subsequent political troubles this society was dissolved. Down to the present century, ship building was carried on as mere handicraft, according to traditional use and wont; the consequence was that English ships were inferior to French, and even Spanish vessels, in size, fitness for carrying artillery, and above all in the quality of highest moment, speed. It therefore became the practice to use prizes taken from the enemy as models for new ships. Thus in the middle of the 17th century a Dunquerque privateer became the model for the frigates, which then came into use; in the second half of the 18th century a French ship-of-the-line, the "Foudroyant" served in 1799 as model for Nelson's flag ship of the same name; this was a few years ago sold to be broken up, then bought back, and is still in existence;¹ the same was the case with the French ships "Invincible", "Courageux", and the frigate "Hebe", with the Spanish ship "Glorioso", and many others. But as a rule, the English copies were already antiquated ere they could be brought into action, the foreigner having meanwhile, thanks to his theoretical studies, made further improvements in ship-building. For example the French ship "Canopus" of 80 guns taken in the battle of the Nile was larger than English ships-of-the-line of 98 guns.

¹ Since wrecked. The translator.



Screw ship-of-the-line **"Duke of Wellington"**; 161 guns, 6071 tons, 1999 HP. (1882), at present depot-ship at Portsmouth

The earliest commencement of a scientific education of naval architects was made in 1806 by establishing a SCHOOL OF NAVAL ARCHITECTURE for practical skilled shipbuilders in the dockyards; this was, however, given up again as unnecessary when Sir James



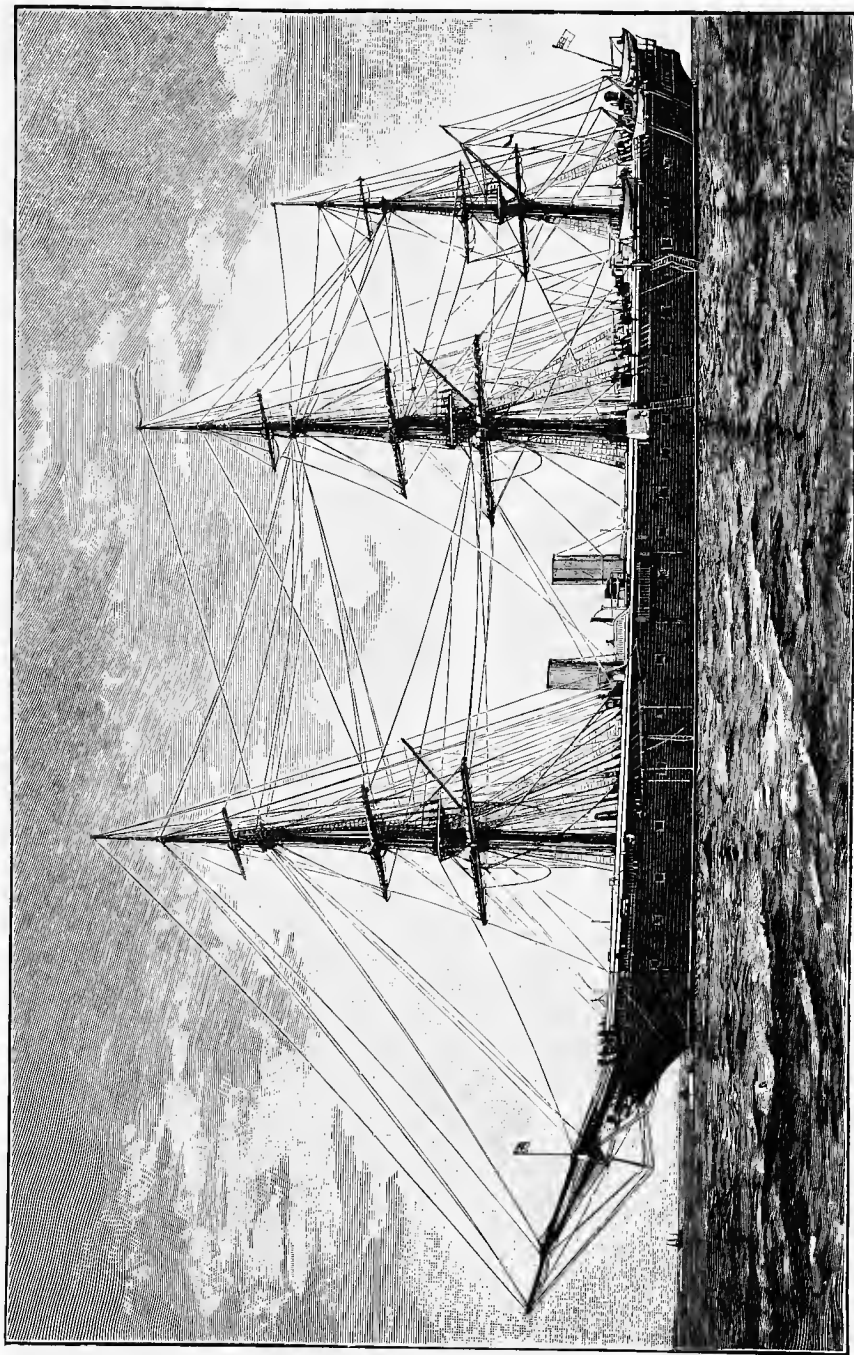
"Duke of Wellington"
Three-decker of 131 guns.

Graham in 1832 carried out his re-organisation of the Navy. The English continued following foreign types, and it is said that as late as 1850 the build of one third of the English Navy consisted of imitations of foreign vessels.

When the School of Naval Architecture was given up Captain W. Symonds, afterwards Sir William Symonds, in his capacity of Director of the technical department introduced scientific methods in the art of naval architecture. By a system of comparative experiments with different classes of ships he was led to the invention of new lines, rejecting the usual lines of construction below the waterline and their hitherto arbitrary proportions..

These new proportions turned out a success. Up to then the proportion of beam to length had been 1:3.6 up to 3.9, and this was now changed to 1:3 $\frac{1}{2}$. The types of those days were: the two-decker "Vanguard" of 80 guns and 3542 tons displacement built in 1835, and the three-decker "Queen" of 110 guns and 4476 tons displacement built in 1839; these were unheard-of dimensions in those days. With greater beam, higher 'tweendecks and more spacious batteries they were steadier and swifter than the ships of older types. Afterwards, in the fifties, this system led to the construction of large three-deckers which marked the culminating point of English sailing men-of-war; these were the "Duke of Wellington" of 131 guns and 6071 tons displacement; the "Marlborough", the "Victoria", and the "Howe", of 121 guns each and respectively 6300 tons and 6557 tons displacement; the two latter were not launched till 1860. These types were already obsolete when they were laid down, and were hardly at all employed; notwithstanding that they had received powerful engines; they were, and still are, only used for harbour-service. The English Admiralty had not kept pace with the times and once more had allowed itself to be outstripped by France. The Screw steamer "Napoleon" of 92 guns, 960 I. H. P. (indicated horse-power) and 14 knots' speed, built by the gifted French naval architect Dupuy de Lôme had astonished everybody and far surpassed everything existing in England up to then. It was now evident, that the day of sailing vessels was past and of paddle steamers also, and the screw, for a long time opposed in England, now became the universal means of propulsion.

The employment of *steam as a motive power* met from the very beginning with determined resistance at the hands of the Admiralty. In 1804 they scornfully refused Fulton's plans, and when three years afterwards he produced on the Hudson his first efficient steamer, the "Clermont", they took no notice of him, nor yet of the rapid progress made in navigation in the subsequent decade and a half. At last, upon the advice of the famous engineer Brunel, they resolved in



Armoured cruiser 1st class **"Black Prince"**; 9210 tons, 4000 HP. (1861)

1822 to order two small paddle steamers, but for all that it took a long time ere the importance of steam to navigation in general was recognized. Up to 1830 steamers were only employed as tugs and in other similar services, but at last five larger paddle steamers of 830 tons displacement and 220 I. H. P. were built, with complete rigging; they were called corvettes and were intended for war purposes. Twelve years afterwards, in 1842, the first steam-paddle frigate the "Firebrand" was built, of 1190 tons displacement and 400 I. H. P. In the same year the first experiment was made with the SCREW proposed by Smith and Ericson in 1836. Two sister-ships were built of 770 tons displacement and 200 I. H. P., the "Rattler" and the "Alecto"; they were alike in every respect and only differed in their mode of propulsion; the "Rattler", a screw-steamer, completely defeated the "Alecto" a paddle-steamer. Nevertheless, and although within a year the United States had launched the "Princeton", a Screw corvette with engines below the waterline, ten more years elapsed ere the "Agamemnon", the first Screw-propelled ship-of-the-line, was launched, a number of large *paddle frigates* having meanwhile been built, carrying on deck the heavy 68 pr. 95 cwt. gun.

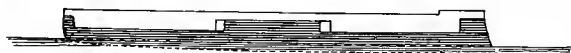
Then came the mighty impulse of the Crimean war. It furnished indubitable proof, that the time of sailing-vessels had gone by, but the Admiralty did not admit this officially till 1859. At the bombardment of Kinburn, the employment of three French iron-clads with surprising success, furnished proof of the fitness and utility of the armour. Now England hastily built armoured vessels according to the French model, and of a number of wooden ships-of-the-line partly finished and partly still building, the hull was lengthened; they were propelled by screw and supplied with auxiliary engines; moreover they built some large screw-propelled wooden frigates of the "Shannon" type of 2667 tons measurement and 600 I. H. P. Alarm was afterwards caused, in 1857, by the appearance in the Thames of the United States' frigate "Niagara" of 4750 tons, and a number of very large ships of the type "Orlando" were built of 3740 tons measurement with very powerful engines of 1000 I. H. P. and heavy armour, but they did not prove a success, the fastenings of the long wooden ships being too weak.

a. Armour-Plated Men-of-War.

It was in France meanwhile that the first armoured war-ship fitted for ramming was built after the plans of Dupuy de Lôme. She was

the "Gloire" of 5000 tons with greatly diminished rigging; was launched in 1858 and caused great alarm in England by her successful trial trip, in which she made 12 knots an hour and exhibited good manœuvring capacity. Then arose the rivalry in the building of such ships more and more nearly perfect, a contest which is not yet ended.

The first counter-move on the English side was to build in 1859 two powerful ships of 9210 tons displacement and 4000 H. P., the "Warrior" and the "Black Prince", just like ordinary frigates with overhanging bows and with complete and heavy rigging, but with armour-plated batteries. These were placed on the stocks at Blackwall and



"Warrior."

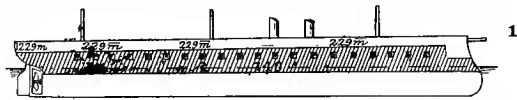
Glasgow and got ready as quickly as possible. It is worthy of note that both these ships were

built of iron as a consequence partly of unsatisfactory experiments made with long wooden ships, and partly of the development of the art of building iron ships in the English mercantile navy upon the advice of the engineer Scott Russell, the builder of the "Great Eastern".

The use of iron for ships of war had been proposed as early as 1834 by Admiral Sir G. Cockburn, after it had been proved to be the best for merchantmen and mail packets; nevertheless the target practice, undertaken experimentally against iron plates, gave such unsatisfactory results, that the Admiralty declined entering upon it. At last, in 1855, a pair of iron frigates were built, but after renewed target practice with unsatisfactory results they were not fitted up for fighting purposes, but employed as transports. The destruction of a Turkish squadron of frigates in the roadstead of Sinope in November 1853 by a Russian squadron of ships-of-the-line proved the terrific effect of shells upon the walls of a wooden ship in so striking a manner, that opinions changed in favour of iron almost everywhere, but with the English Admiralty only to small extent. As late as 1860 they gave orders for several wooden two and three-deckers and demanded a Million Sterling to replenish the stores of timber. The result was that not many years afterwards, when the conviction had gained ground that it was no longer possible to send unarmoured wooden ships into battle, they were sold as useless at a ruinous sacrifice. The transition from wood to iron concerned the Admiralty all the more nearly, as the inexhaustible supply of iron, which the country yields in most favourable positions, would not only prove highly advantageous

to home industry, but also make the country independent of the foreigner, whose timber was indispensable for wooden ships—a circumstance which had made itself painfully felt on former occasions.

The "Warrior" was already launched at the end of 1860; the "Black Prince" two months later; both vessels were armed at first with smooth bore 68 pr. guns, but afterwards with rifled guns of 7 inch calibre and $6\frac{1}{2}$ tons weight. They behaved well, and made $14\frac{1}{2}$ knots an hour; but in consequence of their great length as compared with their beam, viz: 380 ft. to $58\frac{1}{2}$ ft., or about $6\frac{1}{2}$:1 they were not very manageable, and would probably have fared badly with their unarmoured waterline in a combat against vessels such as the "Gloire" and the numerous sister-



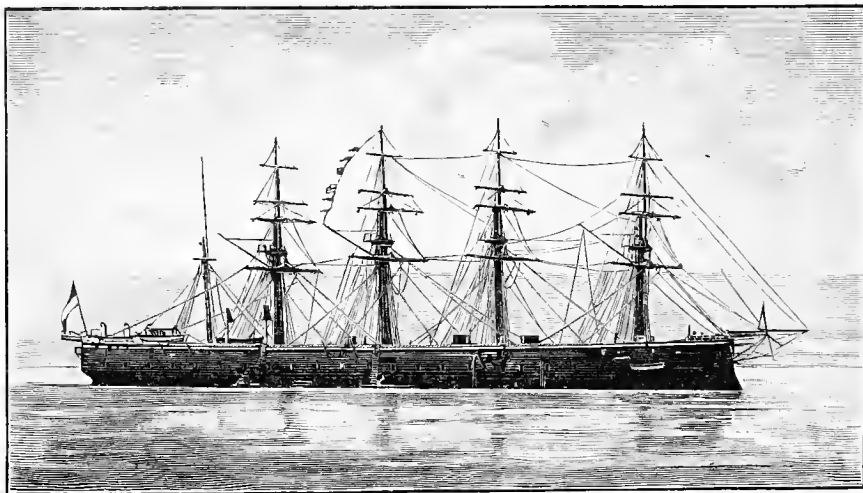
"Agincourt."

ships, which speedily followed her, fully armed and fitted with rams. Both these armoured frigates are still serviceable, in consequence of the indestructibility of strongly built iron ships, but for some years they have been placed in the class of armoured cruisers as being no longer suitable for the line of battle. The "Black Prince" is at present used as a training-ship in Queenstown harbour. They are the oldest ships of the fleet which are still effective.

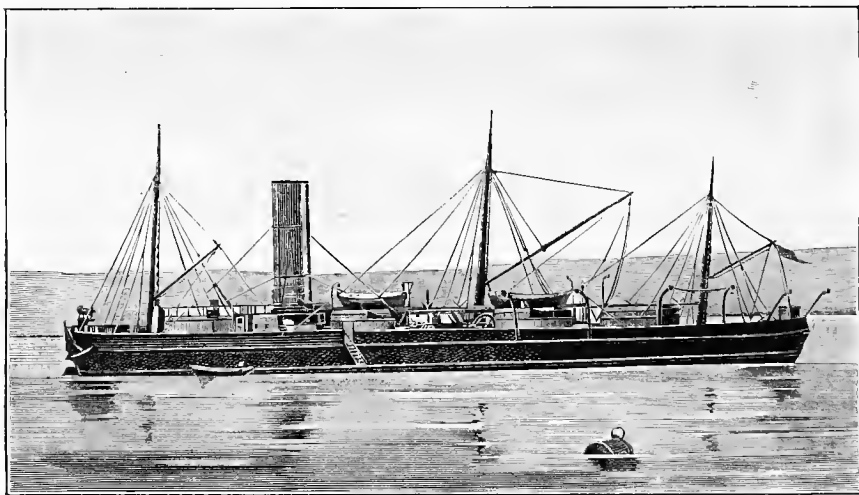
Whilst the French were building in great haste a number of so-called armoured frigates and two armoured ships-of-the-line (two-deckers) after the model of the "Gloire", with such improvements as did not in any essential point depart from the model, there followed in England a number of types of the most varied character; first came two iron-clads of the second class, next 1861/1863 the "Achilles" of 9820 tons and 4000 H. P. with a complete belt of armour and four full-rigged masts; this was followed, 1861/1866, excluding smaller vessels, by three ships of the "Agincourt" type of 10,600 to 10,780 tons and 4000 H. P., 400 ft. long and 60 ft. beam, = $6\cdot7\cdot1$, and five masts. The overhanging bows were abandoned in all these ships, and, except the battery, the armour-plating was extended along the whole water line, and the thickness was increased from $4\frac{1}{2}$ inches to $5\frac{1}{2}$ inches; the armament consisted of guns of 9 inch instead of 7 inch calibre, but they answered the helm scarcely better than the "Warrior" did. These ships also have been transferred for some years to the first class of cruisers.

¹ For the English equivalents of these metric magnitudes see page 295.

In the early sixties there were also built two wooden armoured frigates, and five wooden ships-of-the-line were converted into armoured frigates, and finally the three-decker, "Royal Sovereign",



"Minotaur" (of the "Agincourt" type).



Harbour-Defence Ship, "Royal Sovereign" (of the year 1863).

was converted into a ship without rigging for harbour defence and supplied with four revolving turrets. This was done upon the proposal of Captain Cowper Coles, who had recommended armour-plated re-

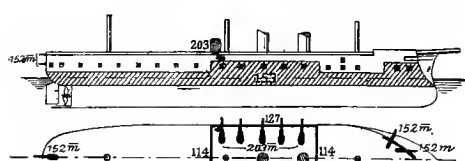


Battleship 3rd class **'Iron Duke'**; 6100 tons, 3500 HP. (1867)

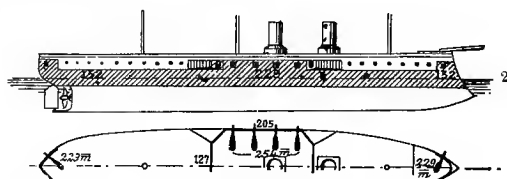
volving turrets with cupolas as early as 1855, six years before the construction of Ericson's "Monitor". At the same time a similar iron ship was built, the "Prince Albert", which is still in use.¹

Then the Constructor-in-Chief of the navy was succeeded by the highly gifted engineer E. Reed, now Sir Edward Reed. He had been educated in the ship-building school at Portsmouth re-established in 1848, but closed again in 1853, owing to the ungracious treatment it had received at the hands of the Admiralty. In spite however of its short existence it supplied the Navy with five Constructors-in-Chief, a striking proof, to which not even the Admiralty could be blind, of the high value of thorough scientific culture to naval constructors. At the instance of the INSTITUTION OF NAVAL ARCHITECTS a new school of ship-building was established at South Kensington, intended for merchantmen as well as men-of-war. It has contributed so greatly to the advancement of the art of ship-building in England that, from having been in a state of complete prostration in the early part of the century, it now holds a high, if not the highest, rank in the world.

With Sir Edward Reed began the building of casemated ships with strong armour plating down to the water line only; short in proportion to the beam, easy to manœuvre, and with casemates amidships mounted with a limited number of heavy ordnance. To this type belong the "Bellerophon", the "Hercules", and the "Sultan" built in 1863—70, of 7550 to 9290 tons, 6520 to 8500 H. P. and 14·2



"Bellerophon."



"Hercules."

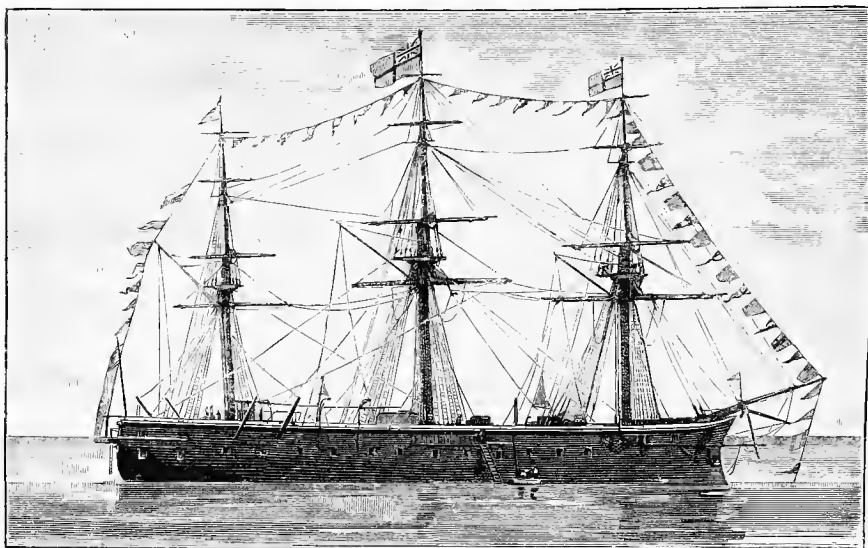
to 15·3 knots' speed. Their length was only 302 to 324 ft. with 55 to 62 ft. beam, being 5·5:1 and 5·2:1. The casemates were each mounted with ten guns of 9 inch, or eight guns of 11 inch calibre. These proved excellent in every respect, as did also the very similar ships constructed by Sir Edward Reed for the German Navy, the "Kaiser" and the "Deutschland". All the three English

¹ In existence, more strictly. The translator.

² See p. 295.

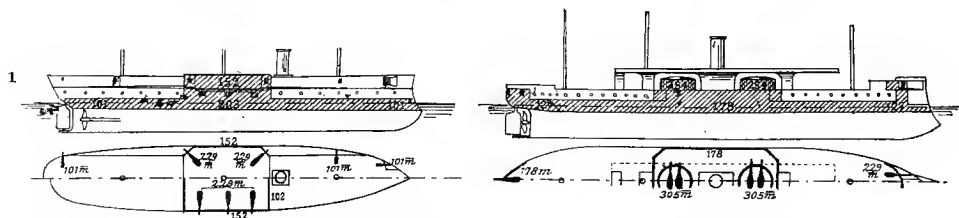
ships have during recent years been converted, and now appear in the Navy List as battle-ships of the third class.

A similar but smaller type of ship is represented by the second class battle-ship, "Audacious." She has still shorter casemates



"Bellerophon."

carrying six 9 inch guns standing in two tiers, and is of 6010 tons and 3300 H. P. Of this type there were built six vessels between 1867 and 1870, which are still serviceable, except one which was accidentally destroyed. These are borne on the list as battle-ships of the third class. To these had yet to be added a high-freeboard



"Invincible", of the "Audacious" type.

"Monarch."

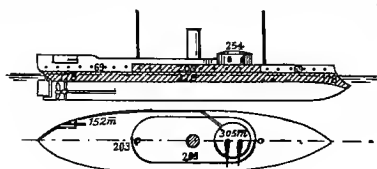
turret-ship, the "Monarch" of 8320 tons and 8000 H. P. with four 12 inch guns placed in pairs in two turrets, which has lately been modernised, and is doing duty as guard-ship at the Cape.

At the same time there was built at the instance of Captain Cowper

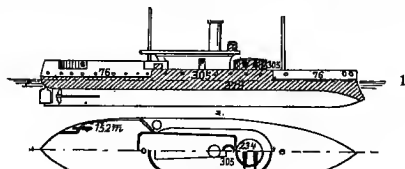
¹ See p. 295.

Coles a low-freeboard turret-ship after the type of the large North-American "Monitor"; but she was made sea-going with full heavy rigging like all the English armoured ships up to that date—and with iron tripods instead of the masts and shrouds incompatible with this kind of structure. Being added to the Channel Squadron she was struck on the 6th of September 1870 near Cape Finisterre by a heavy squall, capsized and foundered with the whole crew.

In spite of this the Admiralty adhered to the "Monitor" type. In addition to the smaller but heavily armoured rams, the "Hotspur" and the "Rupert" of 4070 tons and 5440 tons respectively, they

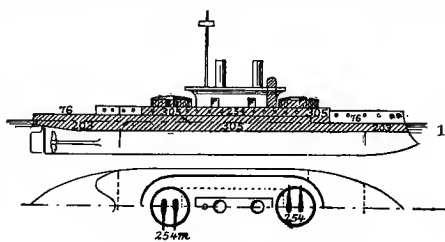


"Hotspur."



"Rupert."

built between 1869—1871 seven high-freeboard Monitors of from 2900 to 4910 tons, two of which were handed over to the Indian government for coast defence, and also two powerful battle-ships, the "Devastation" and the "Thunderer" of 9330 tons displacement, with an armour of from 12 to 14 inches thick and with two revolving turrets. These were the first seagoing battle-ships without rigging and



"Devastation."

all of them were propelled by twin screws. Now at last a rupture with the traditions of centuries was effected, and this may be regarded as the line of *demarcation between the old and the new period of men-of-war*, albeit that in reality the actual change had been effected a full decade earlier. For about 250 years ships had been classified according to their rigging, but when rigging was abandoned a new principle of classification had to be adopted.

The first of the old system of classification dates from 1546, the time of Henry VIII. It classified the ships of the fleet into ships, galleasses, pinnaces, and rowing galleys. The next classification dates from 1612; it divided the ships: (1) into large vessels of from 1200

¹ See p. 295.

to 800 tons; (2) into ships of medium size of from 800 to 600 tons; (3) into small ships of from 600 to 300 tons, and lastly (4) into pinnaces under 300 tons. In 1626, in the reign of Charles I., ships were "*rated*" into 6 ranks, which remained in force till about 30 years ago. At first the basis of classification was the size of the crews, but since Cromwell's time, in 1652, the ship was rated according to the *number of her guns*.

The vessels of the four highest rates formed the battle-line, the fifth comprised the frigates, the sixth the corvettes, brigs, cutters, &c. In Nelson's time the ships of 100 or more guns constituted the first class, those of 98 to 90 guns the second class, 80 to 64 guns the third class, 50 guns the fourth class, 44 to 32 guns the fifth class, and 28 guns the sixth class. Vessels like fireships, bomb-ketches, &c. were not rated. In those days only the ships of the first three rates were placed in battle line; ships of 50 guns have been excluded from it ever since the Seven Years' War.

In 1719 limits were drawn to the magnitude of the ships of the several classes, which was most disadvantageous to the expansion of the fleet. The rate of progress since the battle of Blenheim, won in 1704 by Eugene and Marlborough, can be illustrated by one single enumeration and tabulation of 4 ships:

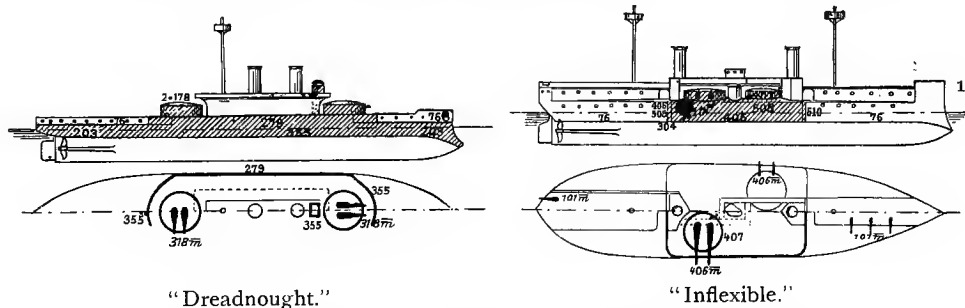
	"Blenheim" of the year	Rate	No. of guns	No. of tons	Length in ft.	Beam in ft.	Ratio of length to Beam	Complement of men	No. of tons per man of the Complement
1	1709	Ship of the Line 2nd rate .	90	1557	161	47	3'44 : 1	750	2
2	1761	ditto	90	1827	175'5	48	3'6 : 1	750	2'4
3	1813	Ship of the Line 3rd rate .	74	1832	175'8	48	3'6 : 1	590	3'1
4	1890	Cruiser 1st class	30	9000	375	65	5'77 : 1	590	15'25

Of the ships 1, 2, and 3, the size is given in tons measurement of former days, of 4 in tons displacement; but even if the old measurement were estimated at 50⁰/₁₀ more when translated into tons displacement, yet there results a very large increase in the size of the

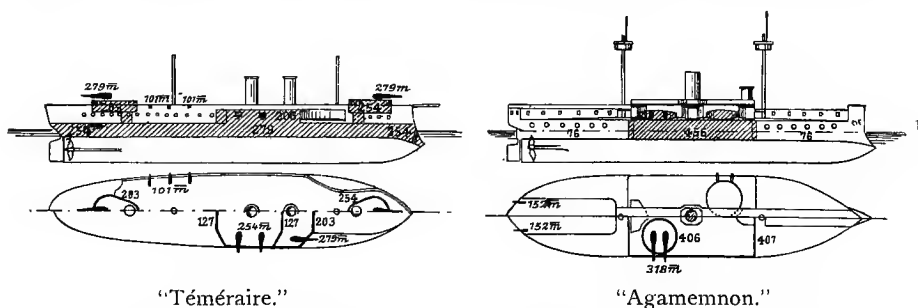
Proportion per gun					
No.	Men	Tons	No.	Men	Tons
1	8 ¹ / ₃	17'3	3	8	27'5
2	8 ¹ / ₃	20'3	4	19 ² / ₃	300

ship in proportion to the strength of the ship's complement of men, and to the number of tons as compared with that of guns. The next striking change is the proportion of length to beam. The men have now much more room on board, and far fewer are employed in working the guns; in the "Blenheim" of the present day very many of the crew are engaged with the engines of 21,400 H. P., which with boilers and coal-bunkers occupy a large part of the space of the ship.

The "Devastation" and the "Thunderer" were followed in 1875



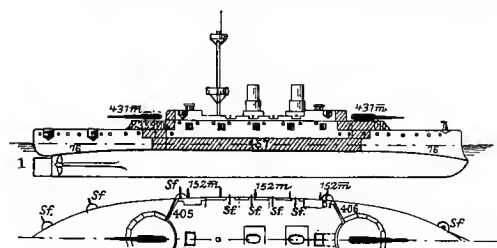
and 1876 by two similar, still larger, turret-ships without masts, the "Dreadnought" and the "Inflexible" of 10,820 and 11,880 tons respectively, the latter armoured with plates 16 to 24 inches thick and armed with 4 muzzle loaders of 16 inch calibre and weighing 80 tons; this marks the highest points reached in that direction both with respect to the thickness of the armour and the weight of the guns, which add 3000 tons to the weight of the ship. To these



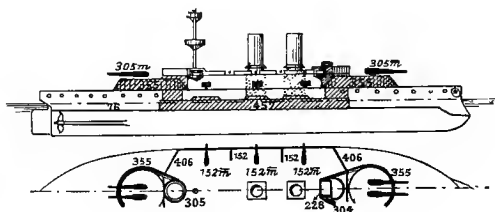
were added at that time two pairs of casemated ships, one pair propelled by *single* screws was purchased from insolvent foreign governments, and the other pair, propelled by *twin* screws in accordance with the practice followed ever since 1870. One of these, the "Téméraire",

¹ See p. 295.

had four heavy guns placed after a French model in *fixed armoured turrets* (EN BARBETTE), each being of a type of its own. Towards the end of the seventies there were built two somewhat smaller, very broad turret-ships, which made only 12 knots and were not very manageable; the last *iron* battle-ships of the fleet, the "Agamemnon" and the "Ajax." These were followed in 1882 by two similar, but greatly improved and larger turret-ships, the "Colossus" and the "Edinburgh" making easily 14 knots an hour, but built of *steel*, which henceforward was used exclusively. Between 1882 and 1886 were built the six ships called the "Admiral Class", because, essentially, they are all of one type and are named after famous admirals; although they are not exactly like each other—for they vary in weight between 9500 and 10,600 tons—yet there is great similarity between them, all being built of steel and armoured on the waterline only about $\frac{3}{8}$ of their length, the fore- and after-parts protected by a turtle-backed armour-deck; they are propelled by twin screws and their heavy guns are placed in barbettes, one in the fore-, and the other in the after-part of the ship, and between them is an unarmoured battery of 6 to 10 quick-firing guns of 6 inch calibre, in addition to a considerable number of smaller quick-firing and machine guns. The heavy artillery however varies greatly; the "Benbow" of 10,600 tons has two guns of $16\frac{1}{4}$ inch calibre weighing 111 tons, four other ships have each four guns of $13\frac{1}{2}$ inch calibre weighing 67 tons; the "Collingwood" of 9500 tons has four guns of



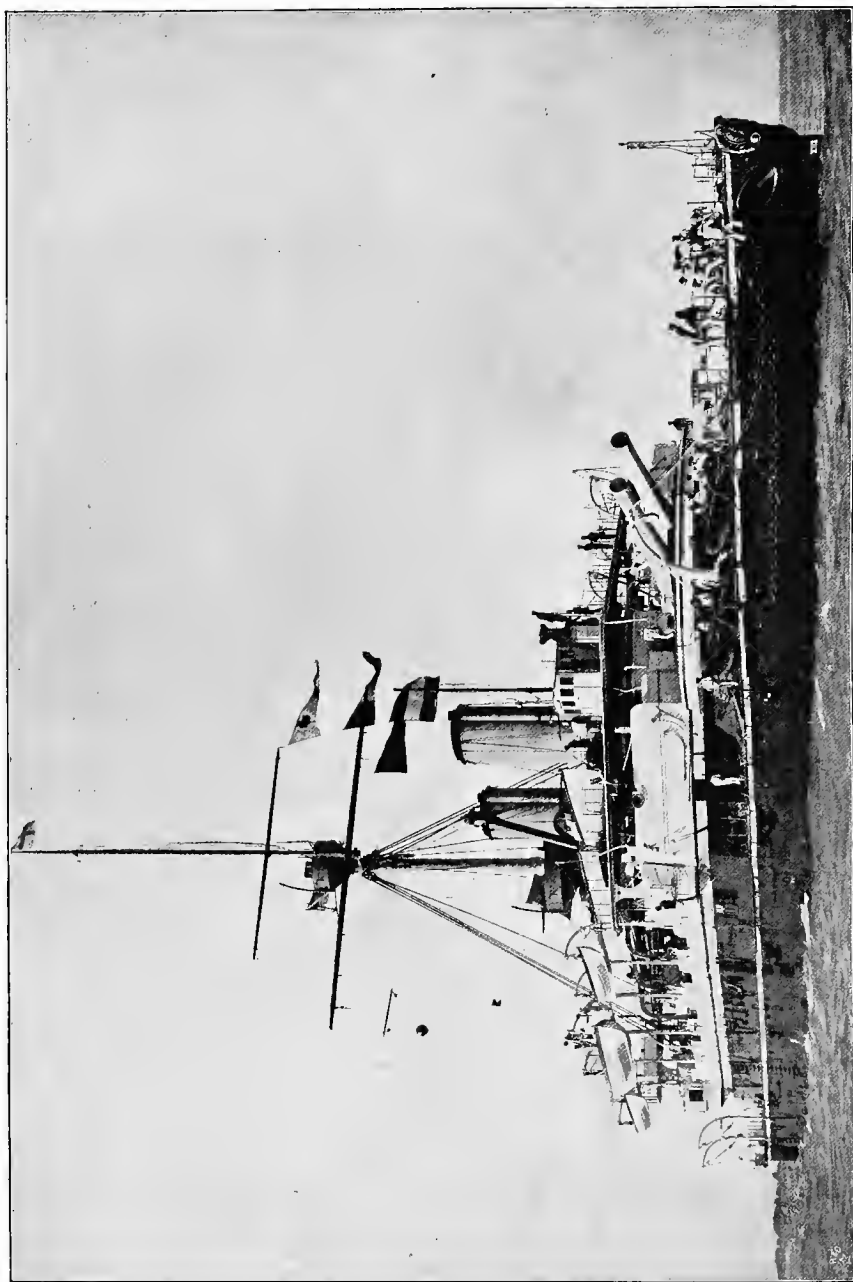
"Benbow."



"Collingwood."

12 inch calibre and weighing 45 tons. But all this variety notwithstanding, it is obviously intended to produce a large number of ships of *one* type, i. e. of *like tactical character*. These were followed between 1885 and 1888 by powerful ships of a totally different type, viz: two turret-ships, the "Nile" and the "Trafalgar" of nearly 12,000 tons displacement, being improved "Dreadnoughts"; each carrying two guns of $13\frac{1}{2}$ inch calibre and 67 tons weight in each

¹ See p. 295.

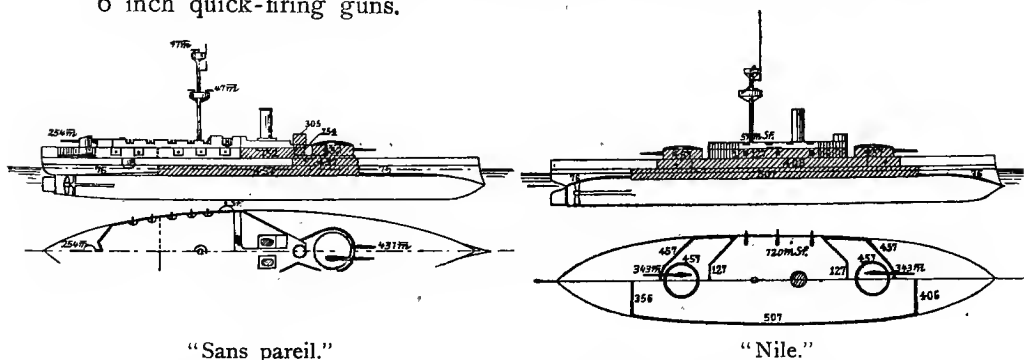


Battleship 1st class **"Camperdown"**; 10,600 tons, 11,500 HP. (1882)



Battleship 1st class "Trafalgar"; 11,940 tons, 12,000 HP. (1887)

turret, and having an armoured battery of six quick firing guns of $4\frac{3}{4}$ inch calibre amidships; also two ships, the "Victoria", which has gone to the bottom, and the "Sans pareil", of 10,740 tons with a single revolving turret forward, within which there are placed two gigantic guns each of 111 tons weight, and having abaft a 29 ton gun of 10 inch calibre, and amidships an unarmoured battery of 6 inch quick-firing guns.



It appears then that the armoured battle ships built between 1860 and 1888—independent of the rams and coast defences and slight differences like those mentioned in the Admiral class—represent no less than 25 *different types* of very unequal tactical qualities, making them either merely conditionally fit, or entirely unfit for co-operation in battle.

b. Cruisers.

With respect to *cruisers* also the plans had up to that period been neither consistent nor well considered. When sailing vessels were abandoned such as the frigates and corvettes of former days, which used to accompany battle-ships as scouts and served to protect commerce, the Admiralty, anxious not to be outstripped by the United States' ship, the "Niagara", built beautiful, large steam frigates fully rigged like the "Shannon", the "Orlando" and others, which made $11\frac{1}{2}$ to 13 knots under steam; but they were wooden ships, whose structure was not strong enough to stand the strain of the powerful engines of 3500 to about 5000 I. H. P. Nevertheless the Admiralty made no change in their plans till the early sixties, when the iron "Warrior" was already completed, and had proved very efficient both under steam and under canvas. Also the great *wooden screw frigates*

¹ See p. 295.

"Octavia" and others, as well as the powerful wooden screw-ships-of-the-line "Victoria" and several others, were put in commission only once and soon afterwards discarded.

Then there ensued a pause in the building of fast cruisers, till towards the end of the sixties the English navy had nothing to be compared with the "*corvettes rapides*" of the French. But then in 1868 there appeared the cruiser "Inconstant", built by Sir Edward Reed; she was of 5780 tons, propelled by a single screw, the first iron ship whose submerged part was sheathed with wood and coppered.

Her engines built by J. Penn of 1000 nominal H. P., indicated 7360 H. P. in the trial-trips, so that the I. H. P. was more than seven times the nominal H. P. and the ship made 16.51 knots, a speed which up to then had not yet even approximately been attained by any man-of-war. Her capacity for keeping the sea for a long time was also very good; for example, on the 6th of September 1870 the ship was astern of the ill-fated "Captain," and she brought to Plymouth the news of her foundering off Finisterre, travelling at an average rate of $15\frac{3}{4}$ knots. The enormous difference between nominal and indicated H. P. shewn in this ship was the occasion for abandoning in 1872 the former, antiquated and unmeaning designation. Under sail too the Inconstant behaved exceedingly well, but she laboured under the disadvantage of having small coal bunkers, so that, steaming at full power, she could keep the sea only $2\frac{1}{4}$ days, and at 10 knots an hour could only make a voyage of about 2000 nautical miles. This cruiser, which was considered very large in those days, was followed in 1869 by two similar ones made of iron and sheathed with wood, &c., but considerably smaller and cheaper, the "Active" and the "Volage" of 3080 tons. Under steam they attained the high speed of 15 knots and acquitted themselves excellently in every way. Like the "Inconstant" they are not only in existence to this day, but they are still useful, having these ten years uninterruptedly rendered good service as part of the Training squadron. Nevertheless the Admiralty ceased building cruisers of this type, but wholly failing to appreciate the value of speed in maritime warfare, especially for cruisers, they built smaller, comparatively slow cruisers of wood and iron of 2000 tons displacement and of about the same number of H. P. making 12 to 13 knots. The armament, proportionally light, consisted of muzzle-loaders in positions adopted at the time of sailing vessels, which had grown obsolete. The French, on the other hand, built after the war of 1870/71 their modern, large, and swift iron cruisers, the "Tour-

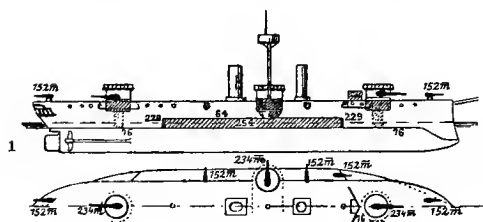
ville" and "Duquesne" of about 5800 tons displacement, and having a speed of 17 knots, with heavy guns placed in embrasures for bow and stern fire, &c., and the "Duguay Trouin" of 3660 tons and 16 knots, which are serviceable to this day, whilst the corresponding English ships have disappeared all but one.

The English only built a few large cruisers from time to time, such as, in 1873, the "Shah" of 6250 tons, 7840 H. P. and 16 knots' speed, a decided retrogression as compared with the "Inconstant"; also in 1870/71 the "Raleigh" of 5200 tons and only 14 knots' speed, the "Euryalus" and the "Bacchante" of 4130 tons, 5250 H. P. and 15 knots' speed, all of which have disappeared by this time. How little these unprotected and lightly armed cruisers were adapted to the circumstances of modern warfare was seen, when the "Shah", aided by a smaller cruiser was unable, in a fight of several hours' duration, to do any harm to the Peruvian iron-clad the "Huascar" which was a ship of only 2000 tons displacement.

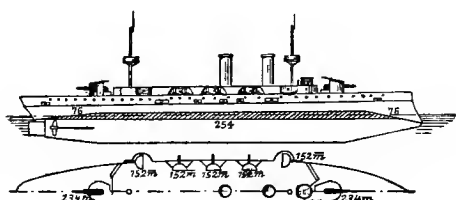
At the same time a new type of ship was commenced, viz: IRON-CLAD CRUISERS, therein following the lead of Russia, who had built some years previously vessels of that type. In 1875/76 three such cruisers were launched, the "Shannon" of 5390 tons, the "Nelson" and the "Northampton" of 7630 tons, but all these lacked the one quality needful to cruisers, speed. Next in 1877/78 the Admiralty made an abrupt innovation by building the *first* unarmoured vessels wholly of *steel*, the "Iris" and the "Mercury" of 3735 tons and 7000 H. P.; they were altogether lightly built, and lightly armed, with *twin* screws, whilst the afore-named ones had all *single* screws. As a perfect contrast to previous procedure every thing was in these ships sacrificed to speed, and the object was gained in a brilliant manner, for the "Mercury" made 18½ knots an hour, thus surpassing all previous achievements. In consideration of their small fighting capacity these ships were called "despatch vessels"; about the same time the old names frigates, corvettes, &c. were given up, and superseded by the designations of cruisers of 1st, 2nd. and 3rd. class, despatch-boats, gun-boats, &c.

Now at last a proper kind of cruisers was commenced; swift vessels suitably armed, and supplied according to the plans of the able and meritorious Admiral Scott with a *protective deck* of steel 1½ inch thick, to protect the engines, boilers, ammunition stores, &c. from the enemy's fire; these were 4 cruisers of the "Amphion" type of 4300 tons, 5000 H. P. and 17 knots; they were built of steel and

had twin screws like all cruisers built from now forward. Then followed two powerful *iron-clad cruisers*, the "Warspite" and the "Imperieuse" of 8400 tons displacement 10,000 H. P. and 17 knots' speed; the compound armour belt for $\frac{2}{3}$ of the ship's length was 10 inches in thickness; they had an armour deck 3 inches thick, turrets *en barbette*, &c, and powerful armament. In the years 1885/87 seven more cruisers of the 1st class of the "Aurora" type were protected

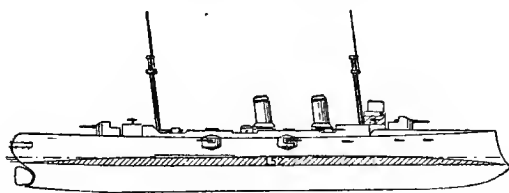


"Imperieuse."



"Aurora."

by an armour belt; they were ships of 5600 tons, 8500 H. P. and 17 to 19½ knots speed. These were the last cruisers, whose sides were protected by armoured belts, and even the far larger vessels, the "Blake" and the "Blenheim" of 9000 tons, which are the last ships built at that time, have only an armoured deck, extending however from stem to stern.



"Blake."

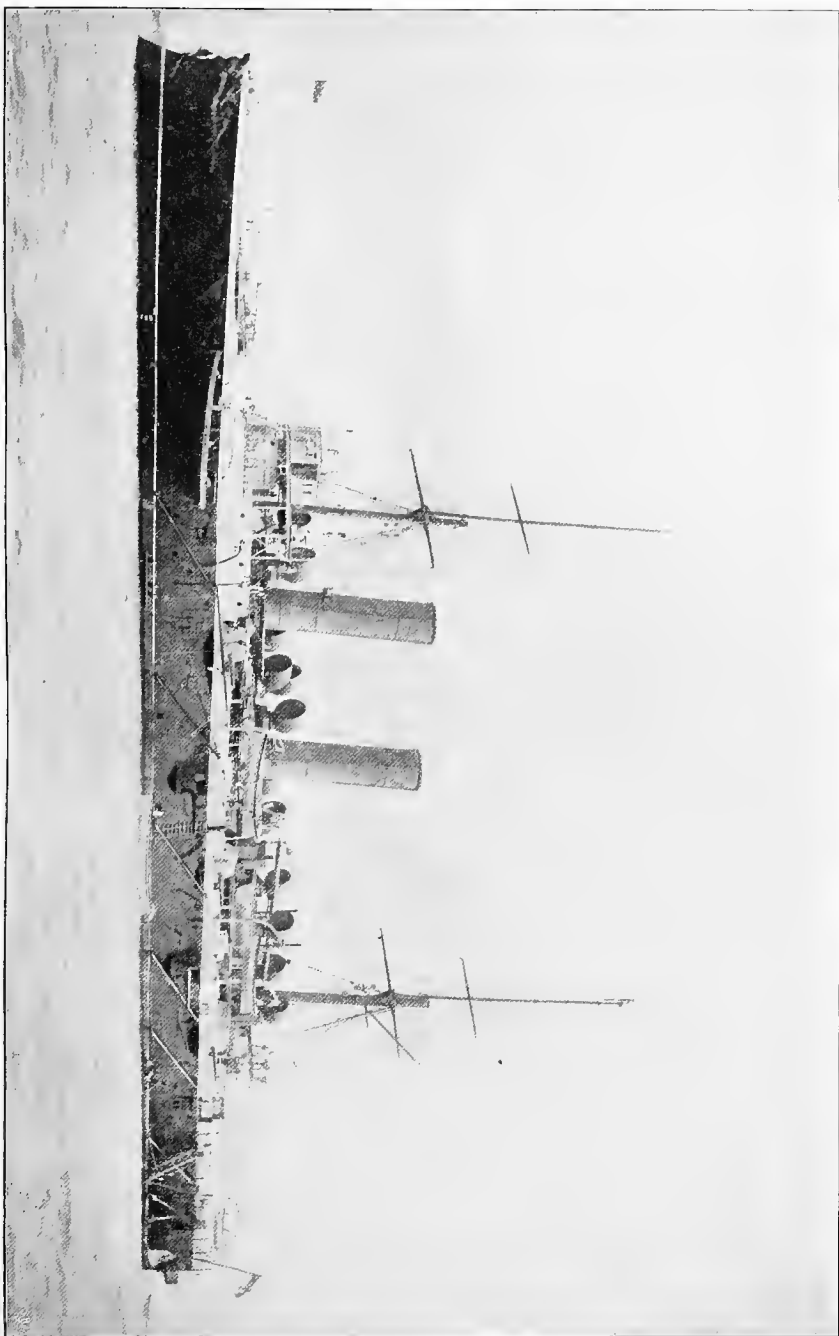
We see then that, up to 1889, the large cruisers also were constructed on various types, those of the

2nd half of the eighties being very serviceable ships; nevertheless there was no general drift or method observable.

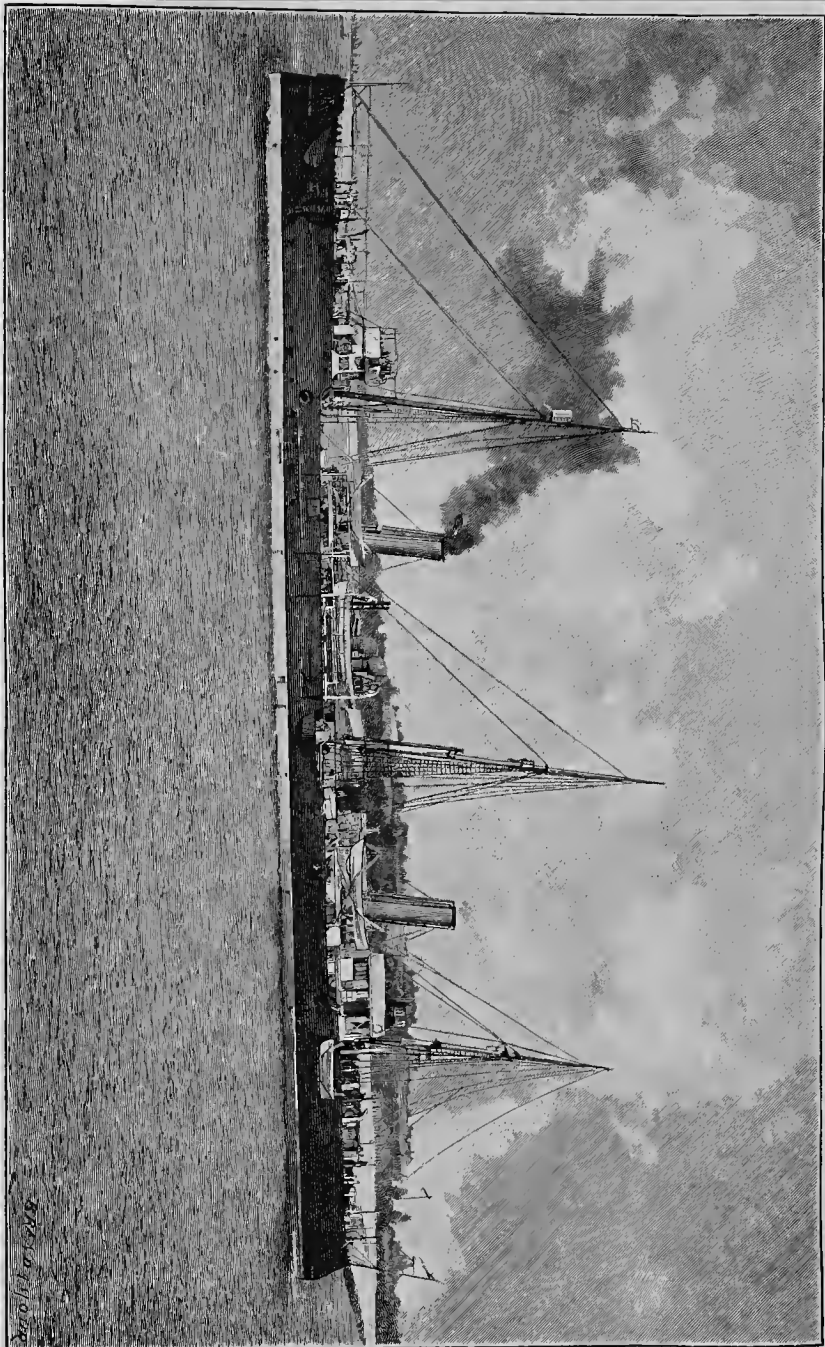
Along with the swift cruisers, the "Iris" and the "Mercury" of 1878/84 there were built SMALLER CRUISERS of the 3rd class of three different types, the "Pylades", the "Calliope" and the "Cordelia," none of which were up to date; they were propelled by *single* screws, were only partially covered by a protective deck, and had a speed of only 11½ to 14½ knots.

Then for a time a kind of ship was built, when the endeavour was made to secure a maximum performance of the engines with a minimum of space and weight. These ships were: eight of the

¹ See p. 295.



Protected cruiser 1st class **'Blenheim'**; 9000 tons, 20,000 HP. (1890)



Protected cruiser 3rd class "**Bellona**"; 1830 tons, 4700 HP. (1890)

"Archer" type of 1770 tons and 3500 H. P. built in the years 1885/87 (one of which, the "Serpent", was lost with the whole crew off Cape Ortegal); five of the "Medea" and "Magicienne" types of respectively 2800 and 2950 tons and 9000 H. P. built in 1887/88; four of the "Barrossa" type of 1580 tons and 3000 H. P. built in 1889, and two of the "Bellona" type of 1830 tons and 4700 H. P. built in 1889/90. Their serviceableness was limited; they gave much occasion for complaint as mishaps to the engines were very frequent; three of the largest are already being used as drill ships. With respect to cruisers of the 3rd class, then, the Admiralty was still in the experimental stage.

Finally there sprung up in the seventies a kind of boat destined to acquire great importance: the TORPEDO-BOATS. The first torpedo-boat was built in 1873 for the Norwegians by Thornycroft (a firm eminent in this kind of shipbuilding); it was a spar-torpedo boat of only 57 ft. length, $17\frac{1}{2}$ tons displacement and 15 knots' speed; but, in spite of this wonderful performance, the Admiralty took no notice of it. Not till four years afterwards, when Russia built torpedo-boats in great numbers, did they order of Thornycroft the first English torpedo-boat, also for spar-torpedo, the "Lightning"; she was 85 ft. long with 27 tons displacement, and with 460 H. P. she attained a speed of 19 knots. Now immediately there were ordered of several firms a dozen torpedo-boats of $18\frac{1}{2}$ knots speed for Whitehead-torpedoes, all of which proved successful; the palm however was carried off by Yarrow, whose boat attained a speed of 22 knots. But at that time the Whitehead-torpedo was still so unreliable and its track so irregular, that opinions about its utility and about torpedo-boats generally were very much divided among the English naval authorities. Accordingly in 1880/84 the Admiralty only ordered a number of 2nd class torpedo-boats making 17 knots to be used as coast defence; they carried a torpedo suspended in dropping gear each side, as also did steam pinnaces subsequently.

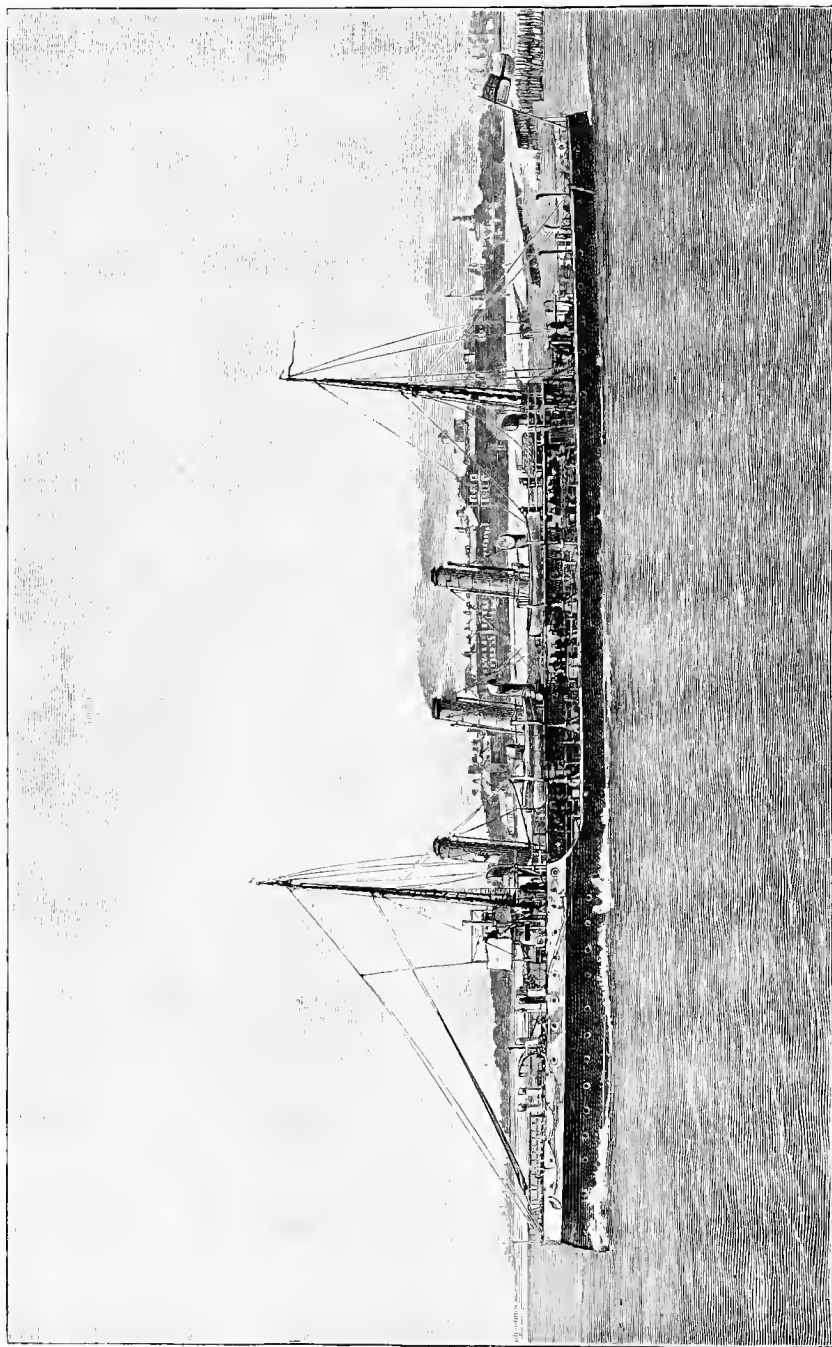
When at last in 1885 Russia had 115, France 50, and England only 19 first class torpedo-boats, then the Admiralty ordered and purchased immediately 60 of these boats, on which occasion the firm Yarrow for the first time introduced the turtle deck. Then there ensued a pause once more, and not till 1887 was a further number of torpedo-boats ordered including the "Number 80", which had a length of $134\frac{1}{2}$ ft. 1540 H. P. and made 23 knots; since that time the number of torpedo boats was increased, but at a slow rate, their tactical

value not being considered very high. They did not any longer receive names, but were numbered consecutively.

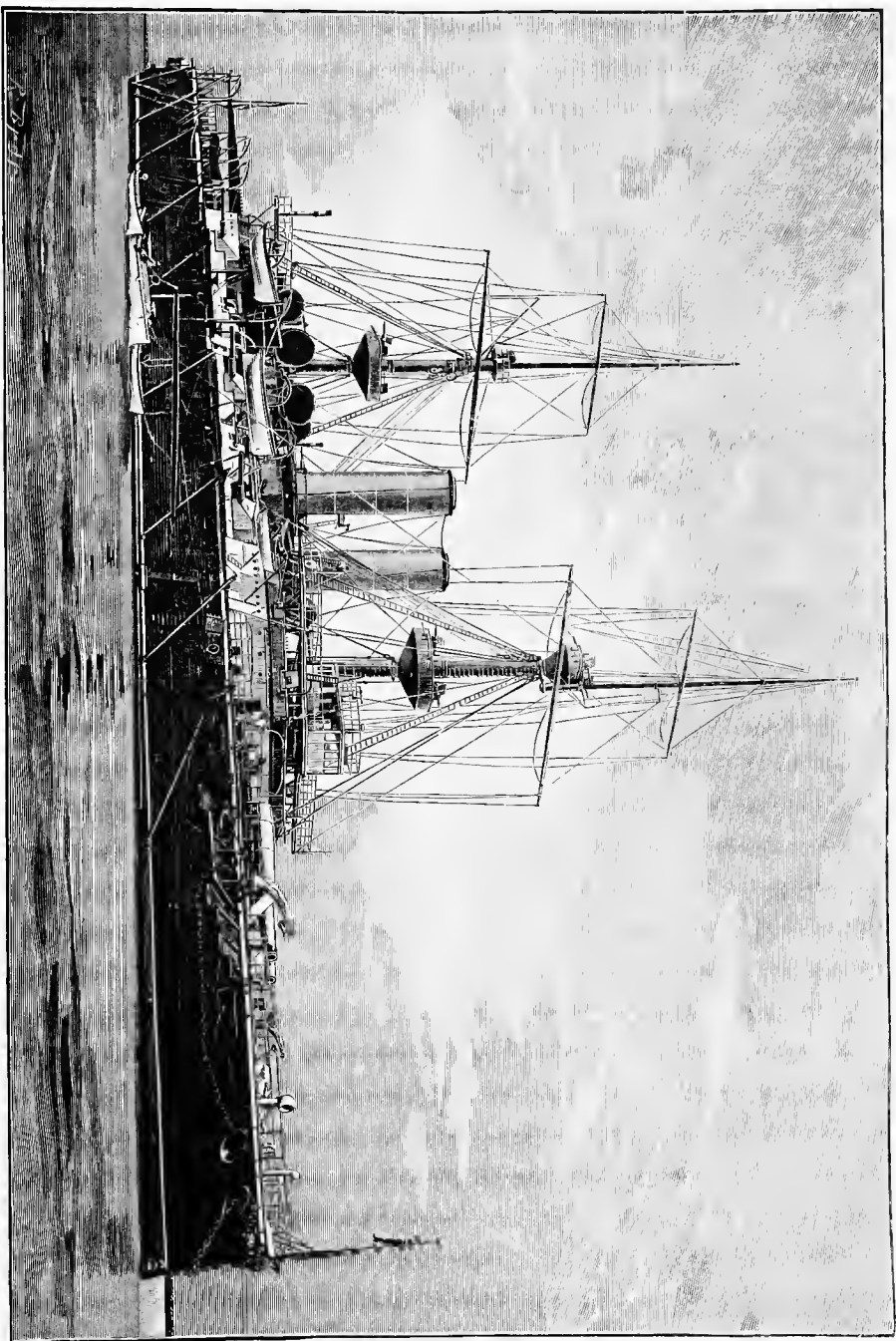
In harmony with the latest views on the *future war operations at sea*, and on the duties the English Navy would have to discharge, and also on the basis of the experience gained in the great manœuvres of the fleet introduced in 1885, the conclusion was arrived at, that torpedo-boats were too little seaworthy and had too limited a capacity for keeping the sea to be of any effectual service in the aggressive movements the English navy would have to carry out, and that to accompany the fleet and ward off the enemy's torpedo-boats, there were needed larger vessels that were seaworthier and had greater staying power, rather than superior speed and artilleristic efficiency, in one word TORPEDO-BOAT CATCHERS. But this only produced a number of disappointments. The first two vessels of this kind of 950 tons and 1200 H P., built in 1885/86, were much too slow; of the next series of four boats built in 1885/87 only *one* was satisfactory, viz: the "Rattlesnake", built by Laird Bros; but her engines considerably exceeded the stipulated weight. The other three, as well as the next following 13 of the "Sharpshooter" type of 735 tons and 3500 H. P. suffered incessantly from breakdowns in consequence of their slight structure, their too light engines, and the employment of forced draught. With respect to torpedoes then, the English were in 1889 still groping in the dark.

2. LATEST DEVELOPMENTS.

The same year 1889 however opened *a new era* with respect to the Material of the English navy; the epoch of *systematic and carefully reasoned out* plans of naval development, such as found expression in the "NAVAL DEFENCE ACT." This important enactment stands out as a mark, which should be observed and imitated by all the navies of the world. It decrees the building of a sufficient number of vessels of the several kinds, with a determined type for each kind; to be carried out in five years, which is a stretch of time not too long for technical prevision, and at the same time *ways and means were at once found for the whole sum required*. These are the only terms on which a naval administration can rapidly and resolutely advance, can utilize every chance as it offers itself, and can, in the shortest possible time and at a minimum of cost, create a force that is a wisely ordered organism in all its parts. History will record it as a permanent credit to the Salisbury Cabinet, that in the mother-



Torpedogunboat 1st class **"Speedy"**; 810 tons, 4500 HP. (1893)



Battleship 1st class "**Royal Sovereign**"; 14,150 tons, 13,000 HP. (1891)

country of parliamentary government, it has dared to break with old, deep-rooted parliamentary traditions, and has embodied in a single demand, for years in advance, the means needful for the building of the navy, the chief and almost the only instrument at the disposal of the country to enforce its political ends.

The Ministers have the credit of it, but the first impulse was given by *naval officers*. These latter have often been reproached, and not unjustly, as is proved by the events of a not very remote past, for adhering too rigidly to old traditions. Their stubborn resistance to the introduction of steam-engines, to shell-guns, to screw-propulsion, to breach loaders, to iron ship building, &c.; their obstinate retention of smooth bore guns, of rigging, and of obsolete types of ship-building were the main cause of the constant technical inferiority of the navy of England to the navy of France, which more than once missed a favourable chance of gaining maritime preponderance both in the Channel and elsewhere.

During the last 15 years however, English naval officers have proved that this rigid conservatism was no inherent quality of theirs, and that all their shortcomings were due to a want of insight into what was just and necessary. Since then, from about the time when the Naval Intelligence Department was created, that is since 1882 a RADICAL CHANGE in the right direction has set in; *intellectual activity* has been displayed, which exercised an irresistible and far-reaching influence on the Admiralty, the government, and the whole nation. All parties are now agreed, that only 10 years ago the navy was not adequate to the duties it had to discharge, and that it is necessary not only to keep it up to its present high level of efficiency, but that it must be permanently and continuously strengthened. In connection with this movement special mention must be made of the merits of the late Admiral of the Fleet, SIR GEOFFREY HORNBY, who was admittedly the most eminent English naval officer, as well as of LORD CHARLES BERESFORD, who preferred resigning his high office as one of the Lords of the Admiralty to consenting, if even by mere silence, to measures, for which he could not accept his share of responsibility. But for the firm *insistance* of these two men and of many other naval officers besides, *on enforcing their views without fear and without regard of consequences to themselves* the rapid, systematic and clear-sighted expansion of the navy, such as we have witnessed since 1889, would never have taken place.

In the said year 1889 the navy numbered only 42 battle-ships, in-

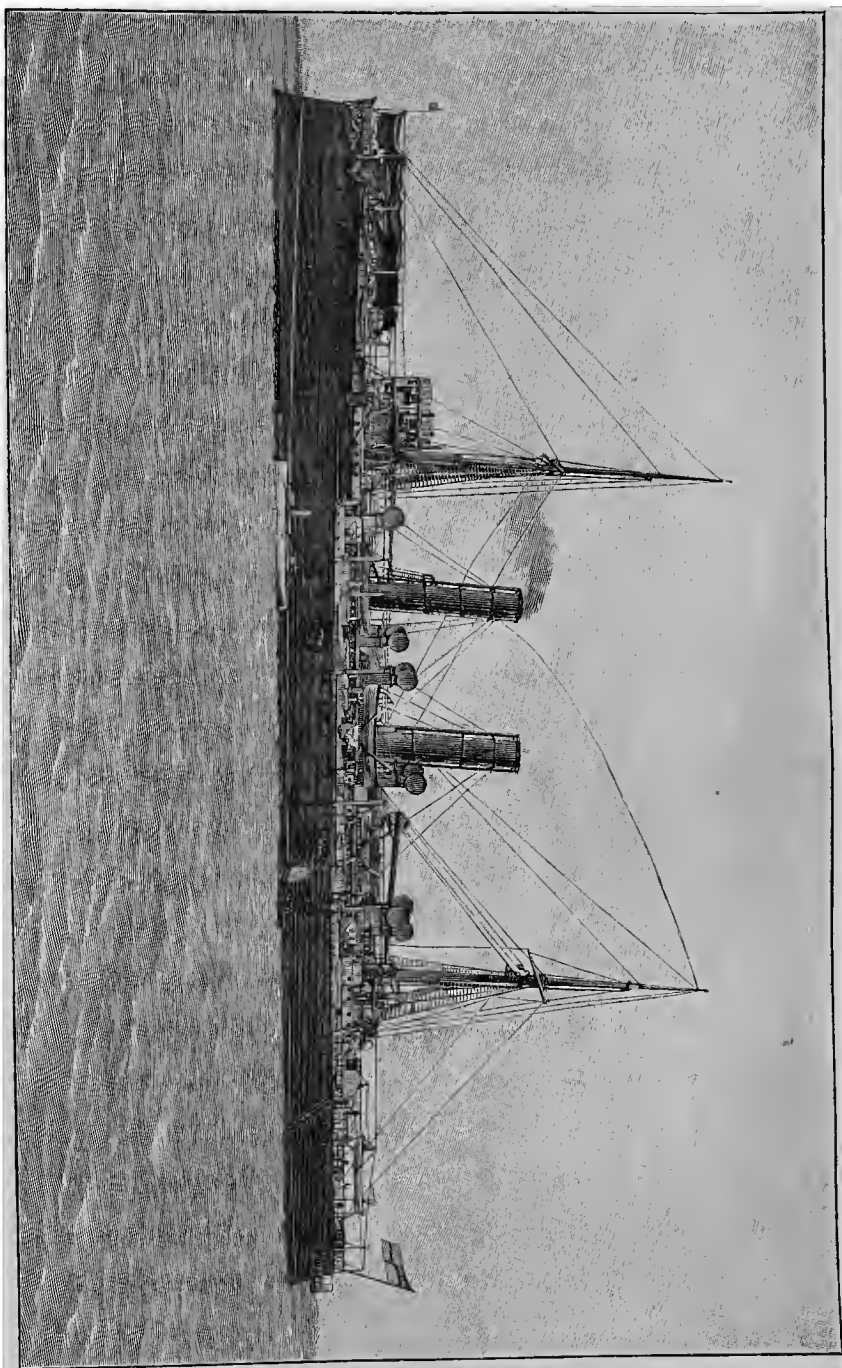
clusive of the oldest vessels, like the "Warrior", as well as those of 2nd and 3rd class; and even of these, ten were out of repair; also 6 armoured and 53 unarmoured cruisers, one ram, one torpedo-boat destroyer, 80 torpedo-boats of 1st class and 51 torpedo-boats of 2nd class; and there were building 7 battle-ships, 6 armoured cruisers, 32 unarmoured cruisers, 12 torpedo-boat destroyers and 16 torpedo-boats. The 32 battle-ships that were in readiness did not represent a force corresponding to their number, owing to their great variety of types, several of which had already become quite obsolete; they were therefore wholly inadequate to discharge the numerous and multifarious duties of the English navy. Still greater was the deficiency in suitable and rapid cruisers required for the protection of English Commerce, which had assumed enormous dimensions during the preceding decade.

The NAVAL DEFENCE ACT of the 31st of May 1889 decreed the building of 70 men-of-war within a period of five years, and the total cost estimated at £22,500,000 was *voted at once*, and in consequence of an increase in the wages and in the price of materials, the amount rose afterwards to £22,800,000. The 70 ships consisted of: 8 battle-ships of the first class, each of 14,150 tons and 13,000 H.P., which surpassed in magnitude any existing ship; 2 battle-ships of the second class, which are larger than the German first class men-of-war; 9 protected cruisers of first class each of 7350 tons and 12,000 H.P.; 29 protected cruisers of second class each of 3400 tons and 9000 H.P.; 4 ditto each of 2575 tons and 7500 H.P., and 18 torpedo-boat destroyers each of 753 tons and 4500 H.P. It thus appears that there were to be built battle-ships of the largest dimensions, superior to every existing hostile vessel and in such numbers, that they would form a very strong squadron of equal tactical units; 42 cruisers also superior in size, power and speed to any existing rival of like kind, and finally a number of very swift torpedo-boat destroyers, but no more torpedo-boats;—all this points to *decisive aggression* directly contrary to the title of the law, but in harmony with the nature of a fleet and with the operations of *all* great naval commanders.

As far as concerns the 8 first class battle-ships of the "Royal Sovereign" type, the principle underlying this type has undergone numerous improvements, viz: strong, long, but not complete compound armour-belt of about two thirds of the ship's length; to it is joined fore and aft a vaulted armour deck, terminating in a ram forward. Over the ends of the armour belt, and separated by an armoured battery or breast work, there rise two armoured turrets *en*

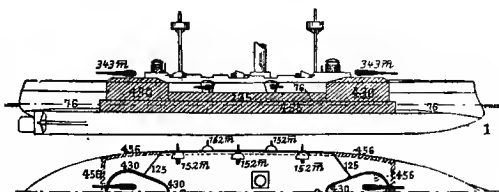


Protected cruiser 2nd class **"Hermione"**; 4360 tons, 9000 HP. (1893)



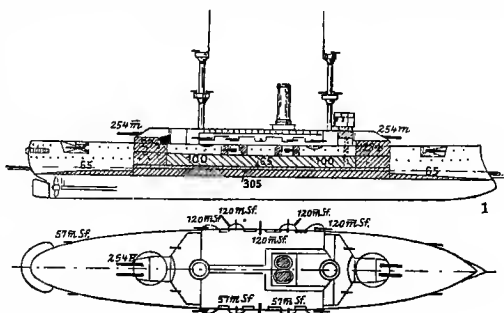
Armoured cruiser 1st class "**Crescent**"; 7700 tons, 12,000 HP. (1892)

barbette, within each of which there are placed on racerpaths 2 breach loaders of $13\frac{1}{2}$ inch calibre and 67 tons weight. The ship's side between the turrets is lightly armed with steel plates up to the upper deck, where ten 6 inch quick firing guns are placed behind armoured shields; besides these there are on deck and in the fighting tops, 38 smaller quick-firing and machine guns, and finally there are held in readiness 7 torpedo tubes of 18 inch calibre. Only one of the 8 ships



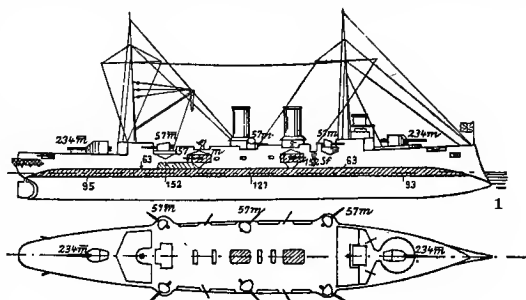
"Royal Sovereign."

carries the 4 heavy guns in closed revolving turrets, but resembles the others in every other respect. The two smaller battle-ships "Barfleur" and "Centurion" of 10,500 tons each are constructed on the same principles, only naturally weaker in armour and guns, the latter weighing 29 tons and worked by hand; their turrets are shielded by armoured cupolas, which give them a great advantage over the "Royal Sovereign", where the turrets are *open*. The speed of the 8 large ships is 17 to $17\frac{1}{2}$ knots, that of the two smaller is $18\frac{1}{2}$ knots, speeds not previously attained by any battle-ships.



"Barfleur."

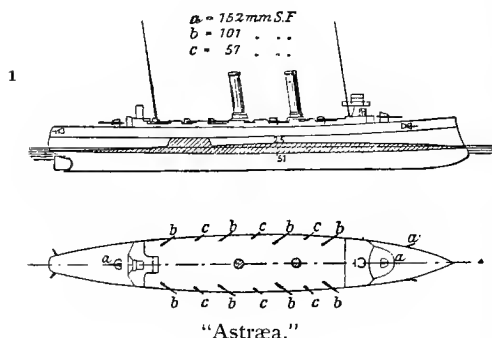
Of the 9 first class cruisers, 4, built on the "Crescent" type, have the ships' bottom sheathed with wood and coppered, so as to enable them to keep the sea for a long time and serve as flagships on foreign stations; this has brought their weight up to 7700 tons; the other five, of the "Edgar" type, have a weight of 7350 tons, as originally



"Edgar."

¹ See p. 265.

planned. They all are without side-armour and have only a strong armoured protective deck, shields for a part of the guns and strongly protected conning towers. Their speed can be raised to 20 knots; if they travel at the rate of 10 knots their store of coals will carry them a distance of 14,000 nautical miles (= upwards of 16,000 statute miles). The 29 second class cruisers, like all the ships of the Naval



Defence Act, are built of steel, propelled by twin screws and have an armoured deck over engines, ammunition-stores and steering apparatus; 8 of them of the type "Astræa" are of 4360 tons, 10 of the type "Æolus" are of 3600 tons, and 11, of the type "Apollo", are of 3400 tons; all are armed with quick firing guns, among

which there are two of 6 inch calibre; their speed is 20 knots and their coalstore is sufficient for 7000 to 9000 nautical miles.

All the ships of the Naval Defence Act, except a few of the smaller ones, were actually finished within the appointed 5 years, that is to say in the month of May 1894, and they have turned out well; it is true the vessels of the type "Royal Sovereign" had to be supplied with bilge keels to reduce their heavy rolling due to their transverse section, but that was all. Battle-ships of this type formed the Channel squadron as early as 1895 at the opening of the Baltic Canal; the first cruisers serve as flagships on foreign stations and so on. The 29 torpedo-boat catchers of the Naval Defence Act actually included 13 of the "Sharpshooter" type, which was launched as far back as 1888. They all turned out *failures*, notwithstanding the repeated changes in the plans of the Constructor-in-Chief. To this circumstance must be ascribed the fact that they were not completed till long after the stipulated time. When the "Sharpshooter" type of 735 tons turned out a failure, recourse was had to a still larger type, that of the "Alarm" of 810 tons and 4500 H.P., and in 1892/93, 11 boats of this type were constructed, and finally they adopted the "Dryad" type of 1970 tons, but it all was unavailing; the 5 vessels of the last type, being more than double the size originally planned, made only

¹ See p. 295.



H. M. S. "**Hornet**" Torpedoblast Destroyer, 240 tons, 4000 HP. Speed 27.6 knots

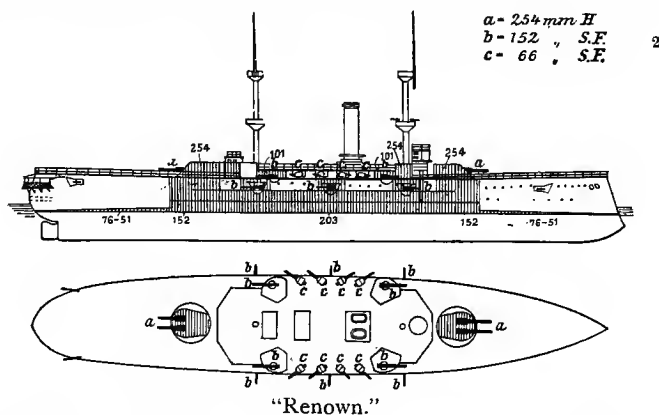


Torpedo-boat-destroyer '**Daring**'; 260 tons, 4200 HP. (1898)

18½ knots, and were in fact slower than the smaller vessels. For the purpose in view a speed is required greater than that of torpedo-boats, and this can only be attained by vessels of similar structure.

They had thus fallen back upon small vessels, which are not fitted for making, after the manner of torpedo-boats, unobserved attacks of surprise, such as are expected of torpedo-boat catchers. These 29 vessels are now borne upon the lists as gunboats of the first class, and in the summer of 1893 the Admiralty suddenly reverted to building numerous small *torpedo-boat de stroyers* similar to torpedo-boats. Immediately the firm Yarrow had built the "Havock",¹ the first vessel of the kind, according to *their own designs*, and had attained the promised speed of 27 knots, and now 42 boats were ordered from a number of eminent shipbuilding firms, ere Parliament had voted the money or even been consulted about it. The firms in question, at present 14 in number, have ever since been working in emulation on *their own designs* and not on those of the Constructor-in-Chief; all they have to do is merely to observe certain general directions. From year to year ever greater successes are recorded.

The liberal Gladstone Rosebery Ministry, that succeeded the con-



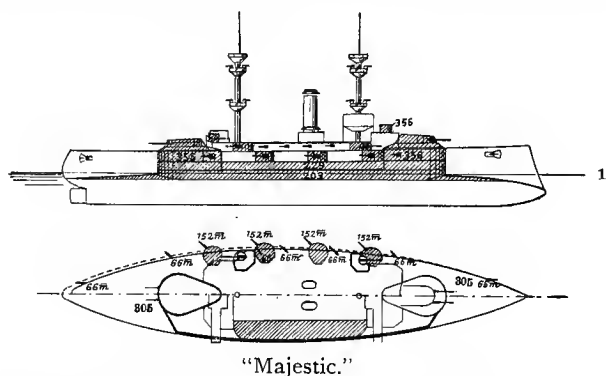
servative Salisbury Ministry, was forced by the irresistible national current of feeling in favour of a powerful navy not only to continue,

¹ More remarkable than even the "Havock" was her sister ship the "Hornet", built simultaneously by the same firm. Not only did the "Hornet" surpass the "Havock" in speed, but she is the first war-vessel of any size and importance that was fitted with "express" water tube boilers, and she has become a type of vessel, which is being adopted as rapidly as possible by every naval power in the world. The translator.

² See p. 295.

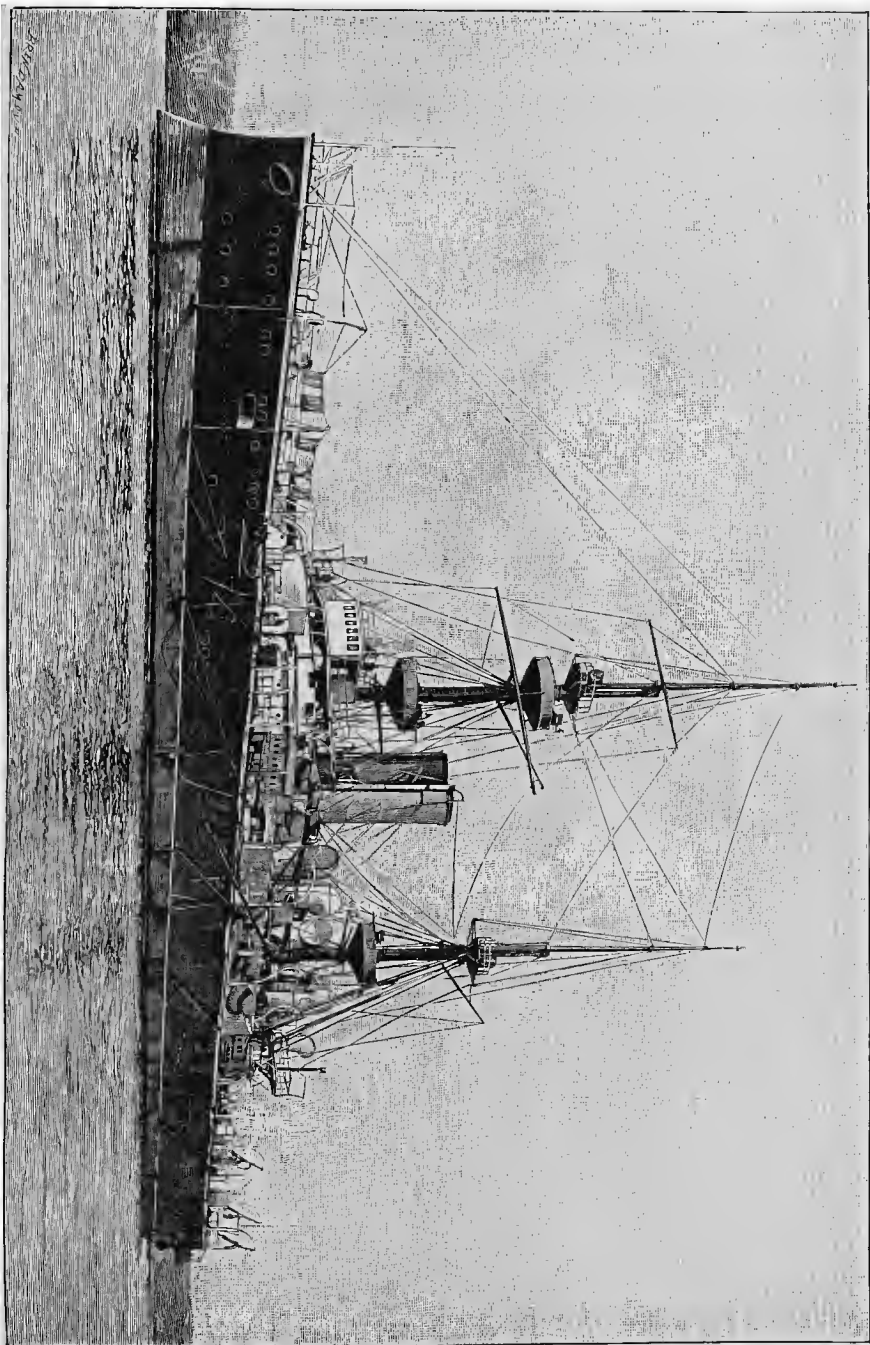
but to *expand* the shipbuilding schemes of their predecessors in office. At first this was not done as heartily by them as it had been done by their opponents, and all parliamentary usages were observed; nevertheless 3 first class battle-ships were put on the stocks. These comprised the largest men-of-war in the world, the "Majestic" and the "Magnificent", each of 14,900 tons, and the "Renown" of 12,350 tons; also 2 gigantic cruisers the "Powerful" and the "Terrible" of 14,200 tons each, which far surpass all the cruisers in existence. They are of 4000 tons, that is 40 % larger than the first class German battle-ships of the type "Brandenburg"; further the Liberals built 3 second class protected cruisers of 5600 tons each, and finally in the summer of 1893 the above-named 42 torpedo-boat destroyers. In the beginning of 1894 the ministry felt the necessity of coming forward with a *magnificent new shipbuilding programme* comprising 71 vessels, the first instalment of which amounting to £4,600,000 for the financial year 1894/95 was voted at once. The programme included in addition to the 3 above-named battle-ships and 5 cruisers, 7 more battle-ships of the "Majestic" type, that is of 14,900 tons each, 6 more protected cruisers of 5600 tons each, 4 small cruisers, 36 torpedo-boat destroyers and 10 first class torpedo-boats.

The "Majestic" type is practically the "Royal Sovereign" over again, but with essential improvements, all the technical progress made

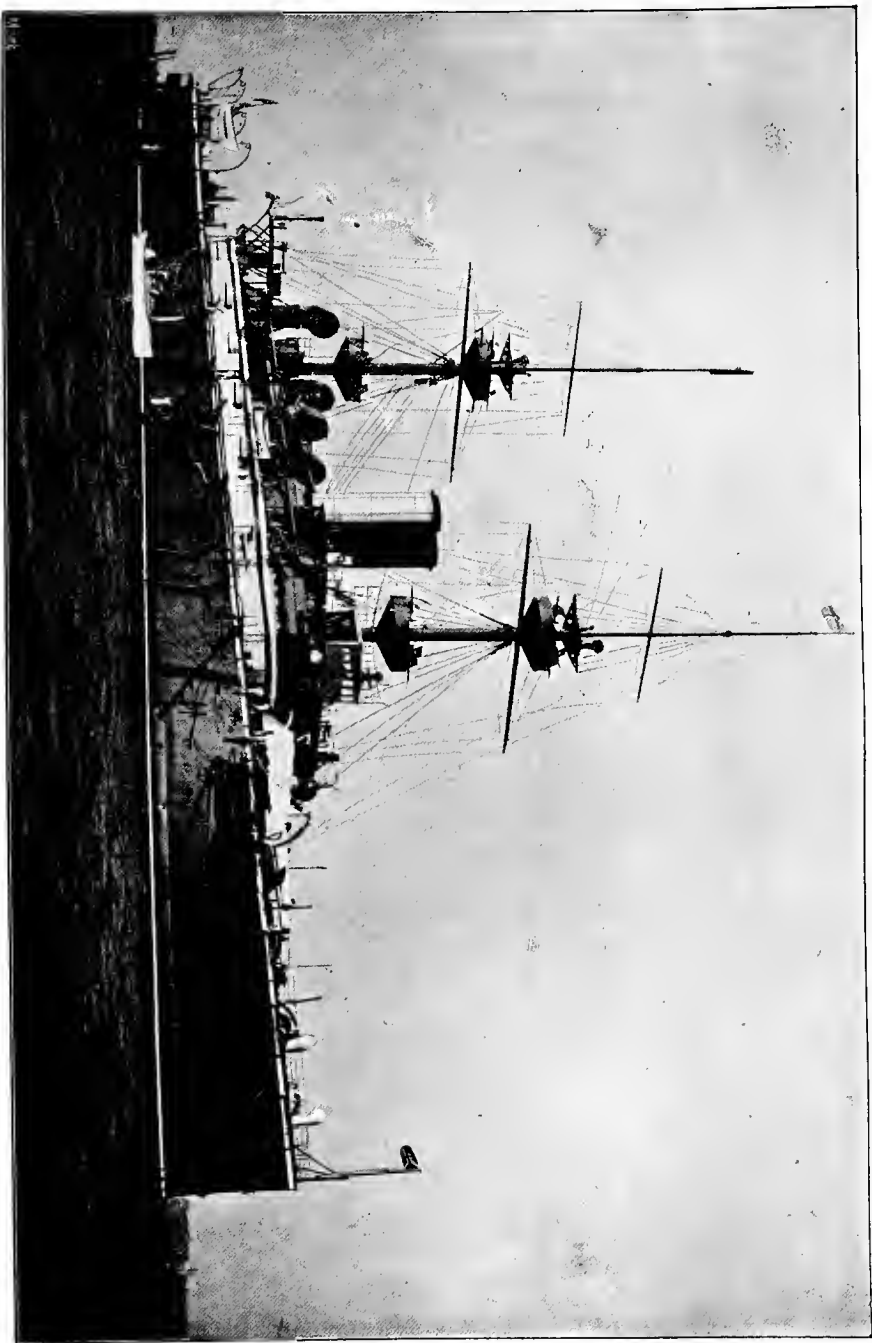


in the meantime having been fully embodied in the construction. Although the new vessel exceeds the old by 750 tons displacement, yet her armoured belt is shorter and only half as thick, viz: 9 inches instead of 18 inches, but its material of hardened nickel steel has much greater power of resistance; moreover the principal pieces of

¹ See p. 295.

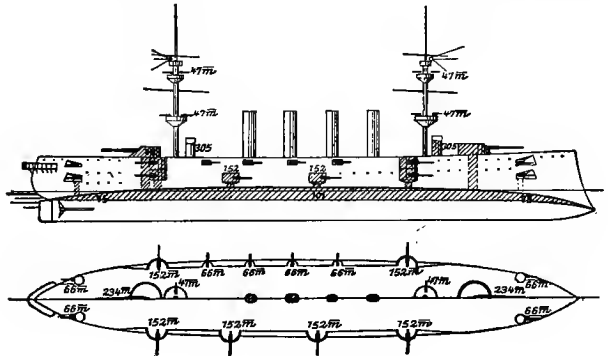


Battleship 1st class "Renown"; 19,350 tons, 12,000 HP. (1895)



Battleship 1st class "**Magnificent**"; 14,900 tons, 12,000 HP. (1894)

ordnance are of 12 inch instead of $13\frac{1}{2}$ inches calibre and weigh 46 tons, but they are wire-wound guns of a newer and more efficient kind. The rest of the armament is increased, there being twelve in lieu of ten 6 inch quick-firing guns, all of which are placed behind

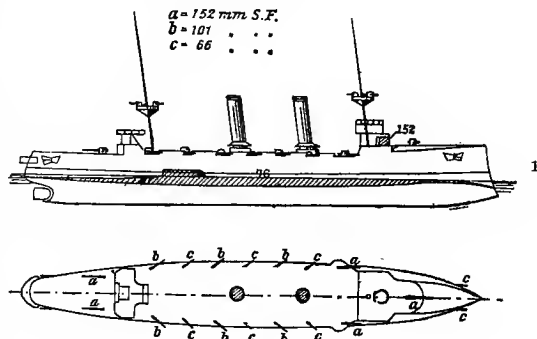


"Terrible."

6 inch armour; the torpedo tubes are submerged like the stern tube, and 3 of the 4 steamboats are fitted for torpedo work.

The two gigantic cruisers of 14,200 tons and 25,000 H.P., make 22 knots, and have room for 3000 tons of coal, sufficing at 10 knots an hour for a distance of 25,000 nautical miles. In building these ships a leap was made in order to have vessels superior to the dreaded commerce destroyers of the United States, and to the large, new, Russian armoured cruisers. They ventured to make the experiment of supplying them with water tube boilers of the Belleville type, which up to then had been tried in England only in small craft but they have turned out a complete success.

The second class protected cruisers of the "Eclipse" type of 5600 tons and 9600 H.P., with protective steel deck of $1\frac{1}{2}$ to 3 inches thick, have given equal satisfaction; their armament consists of five 6 inch guns,



"Eclipse."

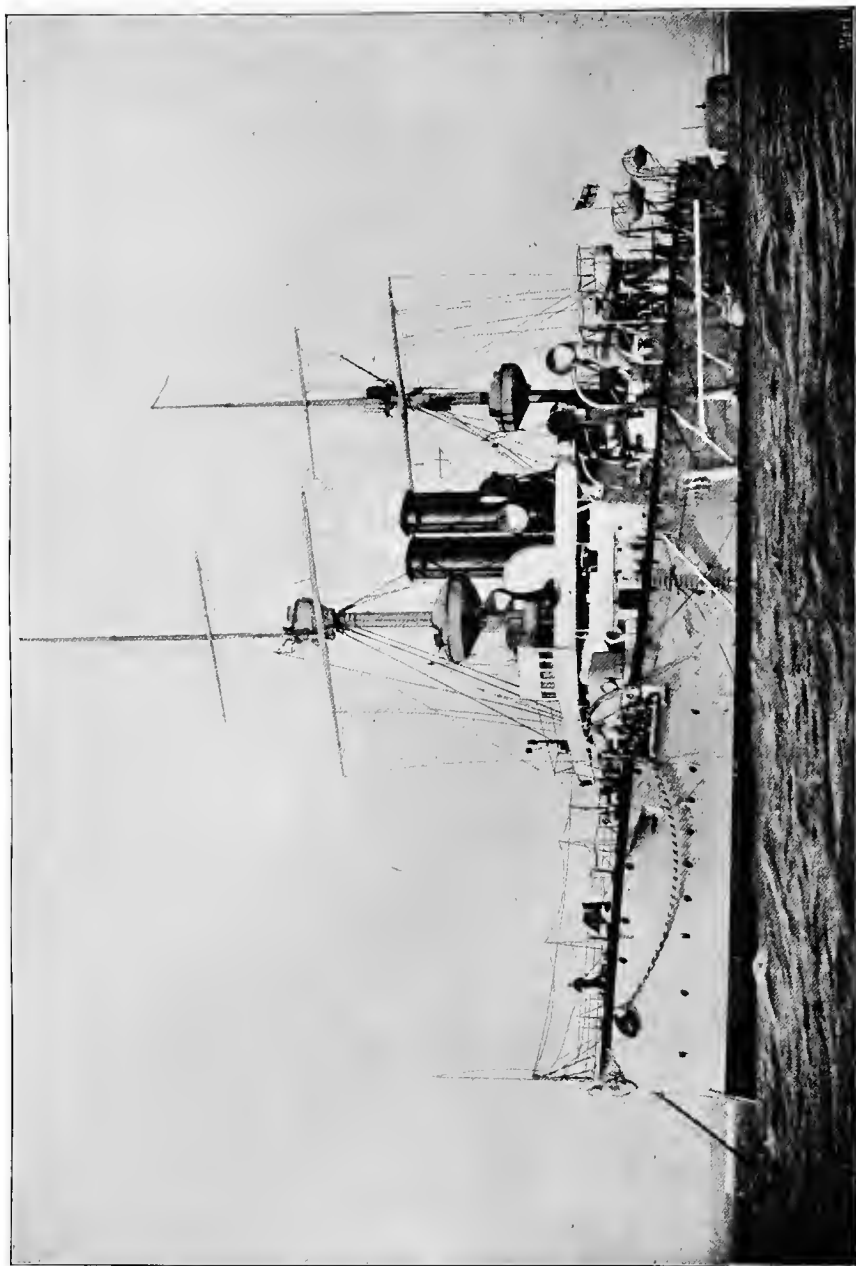
¹ See p. 295.

six $4\frac{3}{4}$ inch guns, 14 smaller quick-firing guns, and 3 torpedo tubes. These cruisers have attained a speed of 20 knots.

In a similar manner the enlargement of the fleet is being continued. The excessive dimensions of 14,900 tons for battle-ships, and 14,200 tons for cruisers have been abandoned; nevertheless none but first class battle-ships are being built, and these so strong that they are superior to all foreign vessels of a similar kind. The principles universally observed are: All ships are to be built of steel, and to be propelled by twin screws, worked by vertical triple expansion engines with water tube boilers mostly of the Belleville type; the armour is to be of hardened steel, the heavy armament of wire-wound guns of the newest type, the rest to consist of none but quick firing guns, the guns to be placed singly and as much as possible behind shields; the torpedo tubes to be placed below water, and great speed secured for all vessels: for battle-ships $18\frac{1}{2}$ knots, for first class cruisers $20\frac{1}{2}$ knots, for second and third class 20 knots, for torpedo-boat destroyers up to 33 knots, and withal great ease in manœuvring, and second class cruisers are to have double rudder for ramming manœuvres. In 1896 there were building: 13 first class battle-ships, 10 first class cruisers, 16 second class cruisers, 7 third class cruisers, and 48 torpedo-boat destroyers.

Moreover 3 older vessels and 15 cruisers are being reconstructed or *renewed*, as has been done for years with ships that are still serviceable for war purposes. The estimates for 1896/97 provide for *new construction* of: 5 first class battle-ships of 12,900 tons, 4 first class cruisers of 11,000 tons, 3 second class cruisers of 5600 tons, 6 third class cruisers of 2135 tons, and 28 torpedo-boat destroyers. Of these, 3 battle-ships and one first class cruiser are, with the exception of the engines, to be built in the Royal dockyards, and the rest, viz: 2 battle-ships, 3 first class, 3 second class, and 5 third class cruisers, as well as the 28 torpedo-boat destroyers, are to be built in private yards, a practice universally observed with torpedo-boats and launches.

The new battle-ships of 12,900 tons, accordingly by 2000 tons less than the "Majestic", and with 2 feet diminished draught, were built on the improved type of the "Renown" with partial armoured belt of 6 inch hardened steel and a protective deck of $2\frac{1}{2}$ inch; the large guns of 12 inch calibre and 46 tons weight in turrets *en barbette* under armoured covers; the armament then agrees with that of the "Majestic", which is larger; the engines are of 13,500 H. P., and



Battleship 1st class „Centurion”; 10,500 tons, 13,000 HP. (1892)

with natural draught they are said to be capable of $18\frac{1}{2}$ knots or $1\frac{3}{4}$ knots more, and being supplied with the more economical water-tube boilers, they are expected to keep the sea longer with an equal coal storage. The new first class cruisers of the "Diadem" type of 11,000 tons, therefore 3200 tons less than the "Powerful", are also sheathed with wood and coppered, in order not to reduce their speed; with 16,500 H. P. they are to make $20\frac{1}{2}$ knots and have storage for 2000 tons of coal, which gives an extraordinary capacity for length of time to keep the sea; they are to receive a protective deck $2\frac{1}{2}$ to 4 inches thick, an armoured conning tower and shields for twelve out of their sixteen 6 inch quick-firing guns, which, together with twelve 4·7 inch and thirteen smaller quick-firing guns, are to be their whole armament. The 6 inch guns then are the heaviest which these large cruisers receive. The new second class cruisers of the "Arrogant" type of 5600 to 5750 tons have a protective steel deck $1\frac{1}{2}$ to 3 inches in thickness; with natural draught they are to run 18 knots, with forced draught 20 knots and have storage for 1000 tons of coal; they are to receive five 6 inch, and six 4·7 inch quick-firing guns, besides some smaller ones. The third class cruisers of the type "Pelorus" of 2135 tons have a 2 inch protective deck and an armament of eight 4 inch quick-firing guns, &c.; with 7000 H. P. they are to make 20 knots, and be able to travel 7000 nautical miles at a 10 knot rate with a coal storage of 250 tons. For further details concerning these and other of the above named vessels see "The British Navy" pp. 296 et seq.

A short time only has been allotted for their construction; but considering the extraordinary performances of both the Royal and the private yards in the building of battle-ships since 1889 it cannot be doubted that the term will be kept. The "Royal Sovereign", for example, of 14,150 tons, built in Portsmouth dockyard (barring the engines, which were supplied by Messrs. Humphreys & Tennant) was finished, put in commission, and enrolled in the Channel fleet within 32 months from the laying down of the first keel plate, having satisfactorily stood all the tests. Of the still larger battle-ships, the "Majestic" and the "Magnificent" of 14,900 tons each, the former was built and finished in Portsmouth within only 22 months, and the latter in Chatham within 24 months. These achievements are great beyond all precedent and were previously considered impossible. From them accrue benefits not only to the navy in these particular instances but to the whole defensive power of the country. It has been said before: "*quick building spells cheap building*", and per contra

"slow building spells dear building"; but not only the mere saving of money and the rapid preparation of war-ships is to be taken into consideration, but also the fact that, during a slow progress of construction, all sorts of alterations and modifications are suggested, which not only still further retard the completion of the ship, and increase the cost, but even impair the original design and the efficiency of the vessel. This happened in France, where they took *ten years* to build a battle-ship, and when finished it shewed such great defects, that it entailed costly reconstruction of a ship only just completed. This is a positive wrong inflicted on the constructor. If the work is to be carried out promptly and in a practical manner a *firm hand guiding the whole technical department* is indispensably necessary, and of this advantage the Admiralty has been in full enjoyment ever since 1889.

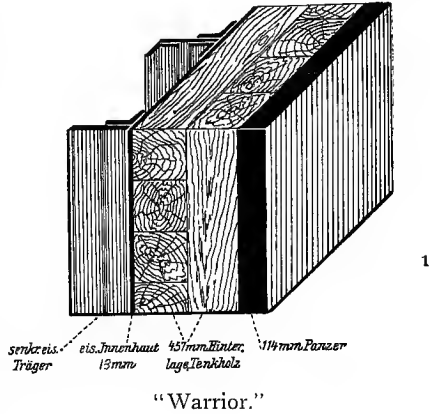
Pari passu with the building of new ships, old battle-ships and cruisers are modernised, if they are considered still fit for the purposes of war, and worth the estimated outlay. Of the older ships, still to some extent powerful, 17 are armed with heavy ordnance, consisting of short muzzle loaders; but to replace these by long breach loaders would entail an expenditure out of all proportion; however they have all been gradually armed with 20 to 30 quick-firing guns, and have also in other respects been adapted to modern circumstances. Vessels, which are no longer serviceable for war, are unhesitatingly rejected.

B. Armour.

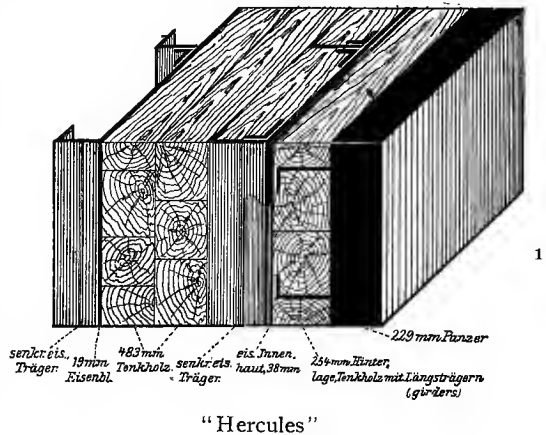
The plates used for the first armoured batteries at the time of the Crimean war, and also for the first armoured vessel, the "Gloire", were of *forged wrought iron*. They were of comparatively small dimensions, those for the "Gloire" measuring 5 ft. by 2 ft. by $4\frac{1}{2}$ inches. In the United States they used for the "Monitor", as late as 1862 and long after, the so called "laminated armour", consisting of several one inch plates joined together with bolts. The fact was, that the manufacture of stout plates was as yet nowhere understood. The laminated armour had far less resisting power than the solid plates, and the thinner the plates were the less was their power of resistance. When iron-clads began to be built in England, Mr. John Brown, an Englishman, hit upon the idea of using ROLLERS for the manufacture of the plates, and made a great success of it. He produced for the "Warrior" $4\frac{1}{2}$ inch plates of much larger dimensions; those made

in 1862 measured 18 ft. by 4 ft., and in 1863 his plates were 12 inches thick.

The plates of the "Warrior" were backed by 18 inch teak wood (which rust does not injure) in two layers; one vertical, and the other horizontal; they rested upon the inner iron skin, the real wall of the ship, and this in its turn was supported by the ribs, &c. of the vessel. This armour, presenting a hard front upon a backing that was elastic and yielding, proved impenetrable to the heaviest English artillery of those days, which were 8 inch 68 pr. 95 cwt. smooth bore guns, and firing with a charge of 16 lbs. of powder a ball weighing 68 lbs. Upon this followed the introduction of *rifled* guns, which led to the contest between guns and armour, which is still undecided.



Wooden ships were armoured by having the plates fixed with bolts upon the sides of the ship, which gave a backing of 2 $\frac{1}{2}$ ft. The ships of the "Minotaur" type were clad with 5 $\frac{1}{2}$ inch armour, backed by teak of only 9 inches, but this structure proved scarcely any stronger than the armour of the "Warrior", and accordingly with the "Hercules" and the "Thunderer" recourse was had to the earlier process, the inner skin having meanwhile in the



"Bellerophon" been made 1 $\frac{1}{2}$ inch thick and strengthened by special iron girders between the beams of the wooden backing. This proved successful and has since been adhered to.

The sides of the "Hercules" were constructed as follows: 9 inch

¹ See p. 295.

wrought iron upon 10 inch teak wood strengthened by iron girders; the whole resting upon a double $\frac{3}{4}$ inch iron wall; behind this there were vertical iron stringers, and the intervals were filled with wood, then there came 9 to 10 inch layers of wood and finally the $\frac{3}{4}$ inch iron ship's wall supported by the ribs and by vertical iron stringers. This wall proved capable of great resistance.

A few years afterwards COMPOUND ARMOUR was invented. It was due to the progress made in artillery, and especially in the conical projectiles, whose hardened point readily entered the comparatively soft surface of the wrought iron plates. This compound armour was proposed by the two firms John Brown and Charles Cammell & Co. Sheffield. About one third of its thickness is of *steel*, and the remainder of wrought iron; the layer of steel is on the surface to receive the hostile shot, and it rests upon the comparatively soft and elastic wrought iron backing—in fact the old principle over again. The interval between the wrought iron plate and the thin steel plate placed at a suitable distance was filled up with molten steel, and the solid plate thus formed was afterwards heated and rolled.

The COMPOUND ARMOUR proved decidedly superior to that of wrought iron. A 12 inch Palliser shot was fired from a 38 ton gun against one of Cammell's 18 inch compound iron plates, 5 inches of which were steel and the rest wrought iron. The projectile was shattered and produced no effect on the plate; consequently compound armour was universally adopted, and this all the more as the English works were not yet able to manufacture stout steel plates. In the English navy compound armour was first used in 1877 in building the battle-ship, "Inflexible."

A new impulse was given by the surprising progress made in the United States in the latter years of the eighties. Schneider's *steel* plates of Creusot gave satisfactory results in competitive trials and proved superior to Cammell's compound armour, but these were excelled in their turn by the North American steel plates, which had an alloy of about 3% of Nickel, the so called NICKEL STEEL. At the same time, Harvey, a North American expert, invented a process for hardening the surface of the nickel steel plates by an addition of carbon, whereby the resisting power of the armour was increased by 25 to 30%. The best armour-projectiles were shattered against this HARDENED NICKEL STEEL ARMOUR, so that it was universally adopted in spite of its being very expensive. In England, steel plates are manufactured on a large scale by Messrs. Vickers, Jones & Co.

of Sheffield; in 1891 trial was made upon one of the Harveyised hardened steel armour plates, and as it proved entirely successful, the thinner armour and shields of the "Centurion" were ordered of that material.

The "Renown" of 1893, and all the battleships after her had their armour belt and the strong breastworks of nickel steel, which, in spite of all the eager rivalry of inventors, remains unsurpassed up to this day, although the great improvement since made in armour-piercing projectiles has dissipated the belief in its invulnerability.

C. Steam-Engines.

How stubbornly and resolutely the Admiralty and the majority of the influential naval officers closed their eyes to the importance of steam-power and its application to navigation has been mentioned above under "Naval Construction." When in 1822, upon an impulse given from without, a beginning was made, small paddle-steamers were employed in the navy merely as tugs, &c., but not for war purposes, whereas, in the mercantile navy they were already rendering useful services for long voyages and as postal packet-boats. It must be admitted that it militated against the use of steampower in the navy that none were known except paddle-steamers with their ponderous balanced beam engines above water, and far projecting paddleboxes, which made turning a lengthy and tedious process; moreover, paddleboxes, wheels, and engines were opposed to the long accustomed use of rigging and broadside armament, and were easily injured by the enemy's fire; the consumption of coal too was very large, and the working of the engines therefore very expensive, and finally, with the slight pressure of those days of only 4 lbs. to 6 lbs. on the square inch, the speed attained was barely 6 to 7 knots an hour. Down to 1837, the nominal horse-power (nom. H. P.), which in those days indicated the power of the engines and did so in official language up to 1872, gave only $2\frac{1}{2}$ indicated or real horse-power, but by 1869 it had risen to 7 indicated horse-power (I. H. P.), that is to say it was nearly trebled. In 1827 Maudslay invented the *Oscillating Engine*, which was introduced into the navy the very next year, but on the whole met with little acceptance; afterwards it was improved by John Penn. In the first 5 decades of this century nearly all the engines for the navy were supplied by the factories of these

two eminent experts as well as by those of Humphries; the Royal yards did not construct engines till 12 years ago.

According to the Navy List, the Royal navy in 1827 contained only 14 steamers, and as late as 1840 no more than 30 steamers; this was probably due to the aversion of Sir W. Symonds, the then Chief of the technical department, to this kind of vessel. Of these 30 steamers 27 still had the heavy beam engines and all were supplied with flue boilers. In 1867 the "Gorgon" was the first vessel supplied with direct acting engines, which were 40⁰/₁₀ lighter, and FIRE-TUBE BOILERS were first introduced in 1843 on board the paddle steamer "Penelope" of 659 H. P. This vessel had been converted from a sailing frigate of 46 guns into a paddle steamer by having her hull lengthened. Both these innovations, the direct acting engines and the tubular boilers, speedily found a wider acceptance. In 1846 was finished the mightiest war-steamer then in existence, the paddle steamer "Terrible" of 1850 tons and 800 H.P. In the years 1846/49 the paddlebox frigate, "Inflexible", of 1122 tons and 328 H.P. circumnavigated the World, partly under sail, and partly under steam. This was the first war-steamer that had accomplished this feat.

About this time the opposition to the introduction of the SCREW began to give way; it had been proposed and tried successfully by Smith and Ericsson as far back as 1836. In 1842 comparative trials had been made between the two sister-sloops, the "Rattler" and the "Alecto" each of 777 tons and 200 H.P.; they had identical engines, but one was propelled by the screw, the other by paddles; the trial proved the superiority of the screw, but the Admiralty disregarded it. This is all the more surprising, seeing the obvious advantages the screw offers in the special case of a man-of-war; it, as well as the engines, being hidden under water and thus protected from injury, and moreover it allowed the retention of the old accustomed shape of the ship, the full broadside armament and the complete rigging with a comparatively slight check on the sailing capacity. In 1849 a similar experimental trial was made between the screw-steamer "Niger" and the paddle-steamer "Basilisk", of 400 H.P. each and the results were identical.

Now the building of screw-frigates, which made 8½ knots, was taken in hand, and moreover wooden sailing ships-of-the-line were lengthened and converted into screw-steamers, which attained a speed of 7 knots. Nevertheless, at the outbreak of the Crimean war, in 1854 a large part of the navy still consisted of sailing vessels, but the experiences

made in the war so expedited matters, even without any naval engagements, that within one year, in 1855, all the sailing vessels were replaced by steamers.

By 1850 tubular boilers had nearly everywhere superseded flue boilers, and the geared engines were superseded by direct acting engines, and the paddle had been wholly abandoned, one of the last ships, on which it was used was the "Duke of Wellington", a great three-decker of 6071 tons and 2000 I. H. P. and 131 guus; the flagship of Admiral Napier in the Baltic. In 1853 the first HIGH-PRESSURE ENGINES, with 60 lbs. pressure per square inch, were built for the navy by J. Penn. They were put on board the screw-sloop, "Malacca" of 1034 tons and 200 H. P., but did not turn out a success. A few years afterwards large wooden frigates of 3740 tons, and 1000 nom. H. P. were built, but they proved too weak in construction for these powerful engines. Marked progress was made in naval construction in 1859 and 1860 by the substitution of iron for wood with the first iron-clads the "Warrior" and the "Black Prince", but the engines supplied by J. Penn were still of the old kind with pressure of only 25 to 26 lbs per square inch. In order to diminish the consumption of coal, which was so much greater in the Royal than in the mercantile navy, competitive trials were instituted in 1860 between the three large firms of J. Penn, Maudslay, and Randolph & Elder, each of whom supplied one of three equally large screw-frigates with engines of their own respective designs, viz. with a trunk engine, a three cylinder expansion engine, and a six cylinder high pressure compound engine with 60 lbs steam pressure per square inch; but the ships did not prove a success; they could only be put in commission once and the competition yielded no useful result. The compound engines were used successfully for the first time in 1866 for the iron-clad corvette "Pallas" of 3780 tons and 3581 I. H. P. with superheater and surface condensation; these engines built by Humphries and Tennant, with a reduced consumption of coal attained a speed of 13.4 knots. This kind of engine soon came into universal use, but the high steam pressure of at least 60 lbs. per square inch necessitated stronger boilers. The Pallas had oval shaped boilers, but soon cylindrical tubular boilers came into vogue instead of the four cornered box boilers.

TWIN SCREWS had been proposed as early as 1860, but they were not employed till 1868 with one of the larger vessels of the navy, viz: the "Penelope" of 4470 tons and 4700 H. P., an iron-clad battle-ship

of the first class designed by E. Reed. These twin-screws gave such good results, that they soon became the rule and for the last 25 years have been adopted for all kinds of ships; only two armoured ships of the "Audacious" type built towards the end of the sixties were propelled by a *single* screw, and 3 cruisers built about the same time, the "Inconstant", the Active and the "Volage" also were constructed with a single screw only. In the frigate "Inconstant", a very large cruiser of 5780 tons, built by Sir E. Reed, the engines of 1000 nom. H.P., built by Penn in 1869, indicated 7360 H.P., so that this ship—the first iron vessel sheathed with wood and coppered—attained a speed of 16.51 knots, the highest on record up to that time.

In 1874 rigging was for the first time wholly abandoned on a man-of-war; it was in the "Devastation", which joined the Channel squadron without it.

An innovation was made in 1876 with the cruisers "Iris" and "Mercury", which were built solely for speed, and, in order to reduce the weight, mild steel was used and the shafts were hollow and of Whitworth steel. The "Mercury" attained a speed of nearly 19 knots and was the swiftest vessel of the day. In later constructions the armoured deck over the engines, boilers, etc., recommended by Admiral R. Scott, made it possible to give to the engine a vertical instead of the horizontal position in use up to then; this greatly reduced both friction and wear and tear.

The year 1883 initiated a new epoch with respect to the engines of the navy, because the *first cruisers*, being large armoured cruisers like the "Warspite" were now built without rigging and received only fighting masts.

In 1886 TRIPLE EXPANSION ENGINES were introduced into the navy for the first time; they were built by Messrs. Laird Bros. for the torpedo gunboat "Rattlesnake"; their weight was in excess of the contract, but they proved very efficient; in fact the vessel was unique amongst ships of like kind. The firm had to pay a heavy fine for this excess of weight, but the money was refunded to them afterwards, when the pre-eminent performance of the engines was taken into consideration.

The endeavour to attain the highest possible performance from the engines was at that time carried to the extremest limit of what was permissible, and sometimes even beyond it. This was due to the circumstance that the Chief Constructor of the navy used his preponderating influence to reduce immoderately both the weight of the

engines and the space allotted to them on board. This not only increased the difficulty of working the engines and reduced at times to a dangerous degree the spaces between the boilers and the coal bunkers, but the boilers and engines were subjected to an excessive strain, if the speed aimed at in the design of the ship was to be attained. For that purpose the steam pressure was raised to from 160 to 200 lbs per square inch and, to reach that, a forced draught was generated by air being driven into the stokeholds.

FORCED DRAUGHT had been used in England in mail steamers as early as 1843, but in the navy not till 1883 in the "Conqueror", &c., the French navy having shewn the way with advantage some years earlier. The favourable results attained thereby, viz. a one inch water column with slight air pressure, led to exaggerated increase of pressure up to 3 or 4 inches of water column, which no fire-tube boiler could stand; the tubes began to leak and, endless mischief, and accidents not a few followed. It seemed as if the fire tube boilers in use had ceased to be serviceable and were to be rejected; this would have caused enormous expense, and many ships of the navy would have been unfit for employment for some years; but in 1892 two engineers invented a ferrule to be fitted into the fire-tubes, giving temporary relief. This was adopted with all the double-ended boilers, forced draught was forbidden, and pressure was not allowed to be higher than $\frac{1}{2}$ inch to 1 inch at the utmost.

At the same time there came into use the WATER TUBE BOILER, which had long been tried and had been employed by Messrs. Thornycroft as far back as 1884. At first it was tried tentatively on steam launches, and then the Admiralty resolved, on the basis of their own and of French experiments, to employ these boilers on the largest scale, viz: on the gigantic cruisers of the "Powerful" type. Each of these vessels received 48 Belville boilers, the firm Maudslay having purchased of the inventor the exclusive right to make them. In the trial trips held a short time previously, they had turned out a marked success and were ordered to be employed on the new battleships and on first and second class cruisers; third class cruisers also were supplied with water-tube boilers, but of English types, and in torpedo-boat destroyers such boilers, of 6 different types, were also used almost to the exclusion of every other. THREE SCREWS had yielded good results on cruisers of the Italian, German, North American, and French navies, but have not yet been tried in the English navy.

AUXILIARY MACHINERY, independent of that used in working the large engines, first became necessary on powerful ships like the "Warrior" and the "Agincourt", &c. Up to then a rudder had been used which was pivoted on the leading edge; when travelling at the high speed of 14 knots it could only be moved very slowly by manual power, and could barely and with difficulty be put hard over; and as the "Warrior's" manœuvring capacity was naturally feeble, she needed 9 mins. and 10 secs. to describe a circle of 3150 ft. in diameter.¹ This led to the introduction of the balance rudder (where the axis is moved one third further back, so that one third of the surface of the rudder lies *before* the axis) which largely remedied this defect; nevertheless in the vessels "Bellerophon" and "Hercules" designed by Sir E. Reed steam-power was employed to work the steering gear. To this were gradually added all the workings requiring great mechanical force, such as weighing anchor, working the pumps, turning the turrets, hoisting heavy boats, ammunition, ashes, &c., ventilating the different compartments of the ship, generating atmospheric pressure for forced draught, and for charging and propelling the torpedoes, for distilling drinking water, for working the electric light of the ship and the search lights, &c. The battleships "Sans pareil" built in 1885/87, received 58 auxiliary engines in addition to the main engines of the vessel. The torpedo dépôt-ship, the "Vulcan" received, besides its 30 torpedoes, 98 engines, and some vessels have more than 100 auxiliary engines on board.

BUILDING OF SHIP'S ENGINES was not begun in the Royal dock-yards till ten years ago. During the first decades the three firms John Penn of Greenwich, Maudsley & Field of London, and Humphreys & Tennant of Deptford were the chief contractors for large ship's engines; since then their number has been largely increased by such firms as Laird Brothers of Birkenhead, J. & G. Thomson of Glasgow, Palmer of Jarrow, Earle of Hull, Hawthorne & Leslie of Newcastle, &c. In building engines for torpedo-boats and torpedo-boat destroyers, the two firms Yarrow and Thornycroft on the Thames are pre-eminent. It is seen then that there is great competition in the market, and this all the more as the Admiralty generally give the contract to the lowest tender.

With respect to the *Ship's Engines* a fixed system has now been

¹ Reckoning the ratio of the circumference to the diameter as 3·14:1 and the knot at 6080 ft., it would result that the speed of vessel was reduced in the curvilinear movement by about 3·35 knots an hour. The translator.

adopted; all the vessels are supplied with inverted triple expansion engines, so that there is very little difference in the designs of the competitors; but with respect to the *Boilers*, there is ample room for innovation, as none of the numerous types of watertube-boilers in use fully satisfies all the requirements. It is a wise regulation of the Admiralty that *the building of new ship's engines is superintended by the ship's engineer*, who has the greatest interest in their working, and moreover, by this superintendence, becomes intimately acquainted with their structure.

For the various *Auxiliary engines* there exist a number of factories, which manufacture solely their several specialities, and contractors generally entrust these engines to them. For example Messrs. Maudsley contracted to supply all the auxiliary engines of the battle-ship "Renown", but they employed 30 smaller firms working in 15 different towns.

With respect to the FUEL also, England is, as in many other respects, more favoured by nature than any other country in the world. South Wales produces close to the coast, and in exhaustible quantity, an all but smokeless coal, which is of special advantage to men-of-war. In consequence of the ever increasing demand, the production of coal has risen enormously during the last 50 years. In 1854 it amounted to $64\frac{2}{3}$ million tons, and in 1892 to $185\frac{1}{2}$ million tons, being little short of three times the quantity.

This is probably the reason, why so little attention has been given to *liquid fuel*. Of the heating power of coal only 10% is practically made use of; with petroleum refuse, the so called ASTAKI, the space on board can be utilized far more profitably, and this fuel possesses moreover greater heating power; according to the opinion of a certain expert it excels coal by 85%. As early as 1868 experiments had been made with this kind of fuel on the paddle-steamer "Oberon"; but they were kept secret and apparently dropped altogether; since 1889 petroleum experiments have been resumed in England, good results having been secured by Russia, Italy, and France in their trials of this fuel; but the English experiments were made only on a torpedo-boat, and led to no noteworthy result.

D. Ordnance.

The decided aversion of the English Admiralty and naval officers in general to change of every kind had brought it about that, in

the construction of ordnance, as in shipbuilding, the English navy was outstripped by foreign navies, especially by that of France. A new kind of gun had been introduced into the navy in 1779. Originally it had been constructed in 1774 according to the plans of General Melville in the "Carron" foundry situated on the river Carron in Scotland, whence the name of the weapon, the CARRONADE. It was more characteristic than ingenious—a simple, short, light, smooth-bore gun of large calibre, throwing large projectiles with small charges. Solid balls being too heavy, hollow balls (grenades) were cast, but these were not charged from fear of danger. The range being short, the carronade could be used only in close combat, where however it proved very effective for firing grape shot against the enemy's decks, especially when it was the practice to place the men in close array on the poop and forecastle. As the English always sought an engagement at close quarters, the carronade soon rose in favour, and was universally adopted. After 1797 it was found in all the ships-of-the-line, but up to 1817 it was not numbered in the guns of the ship, so that, up to that date, the number of guns in English ships was always indicated below the actual truth, which led to numerous recriminations, especially in the war of 1812—1815 with the United States. At first they used the 32 pounder of 6·4 inch calibre, but this was soon supplanted by the then unprecedented and much dreaded calibre of 8 inches, the 32 pounder being still the heaviest gun in use.

It is true that guns of large calibre had been in use previously; for example a 58 pounder of 8 inch calibre was used in the second half of the 17th century, and in the time of George I. the three-deckers carried 42 pounders of 7 inch calibre on the lower deck; but these were rejected after the Seven Years' War as being too unwieldy and straining the ship too much. From now forward the 32 pounder of 6·4 inch calibre was the heaviest gun in the navy and remained so up to 1838. It is probable that the general adoption of the carronade was due to this circumstance.

An invention of far greater importance and consequence was that of the GRENADE-GUN by the French General Paixhans in 1821; this was a long, smooth-bore gun of large calibre, which fired charged shells with great accuracy at long range. At the very first trial it secured a grand result against the wooden walls of a vessel by the bursting of a single shell, nevertheless, owing to the then unfavourable state of things in the French navy, even that navy adopted the

Paixhans gun very slowly. But when in 1837 grenade-guns of 8 inch calibre were universally adopted as part of the armament of French men-of-war and the first "scare" arose on the other side of the Channel, the carronade was given up, and the French example was followed. From that time forward till 1865 the 8 inch shell gun was the principal arm of the English navy, being especially suitable for the large paddle-steamers then coming into use. The heavier numbers fired solid balls; the greatest favourite was the 95 cwt. gun, firing a 64 lb. shell charged with a good 2 lb. of blasting powder and 10 to 16 lbs. charge for the gun.

Slight as were the performances of the navy in the Crimean War, yet it was this war, which speedily led to correct views on naval affairs. The annihilation at Sinope of a Turkish squadron of frigates in November 1853 by a Russian squadron of large ships-of-the-line proved the destructive effects on wooden ships of shells fired by large shell-guns, and the bombardment of Kinburn in 1855 demonstrated the futility of smooth-bore guns even of large calibre against armoured ships. The practical consequence of this lesson also was only slowly understood in England. It is true that RIFLED CANNONS had been used on shore already in 1854. In 1855 Sir Wm. Armstrong constructed his first light rifled gun with an inner steel lining of many groovings and strengthening hoops of wrought iron; it was also a breech-loader with a wedge fitted in from the top and screwed down. The gun had a lead jacket which however frequently flew off, when the gun was fired. This weapon proved very efficient in 1855 at Shoeburyness, and was especially distinguished for accuracy in aiming. It was adopted in the following year and in 1860/61 the 20 pr., 40 pr., and 100 pr. (of $3\frac{3}{4}$, $4\frac{3}{4}$, and 6 inch calibre) were introduced in the navy.

The first armament of the first English iron-clad, the "Warrior" (1861) nevertheless consisted of 38 smooth-bore guns of 75 cwt. and 8 inch calibre, throwing a projectile of 68 lbs. with a charge of 16 lbs.; of these 36 stood in the battery, and only 2 behind protective armour. They commanded an arc of fire of about 50° only. But when this kind of gun proved ineffective against the sides of the "Warrior" it was superseded by a 7 inch rifled gun of $6\frac{1}{2}$ tons, the projectile of which, weighing upwards of 1 cwt. and fired with a charge of 22 lbs., was nearly three times as effective. This initiated, as has been said above, the still undecided contest between gun and armour.

Already, some time before, attempts had been made in England to utilize the extensive stores of heavy, smooth-bore cast iron guns, by cutting groovings into the inner surface of the gun, and strengthening the breech by a wrought-iron jacket, but it did not work. Better results were obtained by inserting an inner lining of steel, but even these were not satisfactory, so that the utilisation of cast-iron tubes for rifled guns had to be abandoned.

These tubes were *muzzle-loaders* as heretofore; and even with the built up tubes they returned to *muzzle-loaders* in 1865, some accidents having occurred with the breechblocks due to the loading-mechanism, which was too complicated. Broadside ordnance being still in use, the guns had of necessity to be short. Armour plating being made ever stronger and of greater resisting power, the penetrative force of the guns had to be increased proportionally and this in its turn entailed a continual augmentation of calibre. Thus the "Bellerophon" of 1865 received 12 ton guns of 9 inch calibre firing projectiles weighing 248 lbs. with a charge of 43 lbs. The "Hercules" of 1868 had 18 ton guns of 10 inch calibre firing projectiles weighing 398 lbs. with a charge of 60 lbs.; the "Monarch" of the same year had 25 ton guns firing projectiles of 600 lbs. with a charge of 70 lbs.; the "Thunderer" of 1872 had guns of the same calibre but weighing 30 tons, the shot of which was fired with a charge of 99 lbs. The rifling studs required for muzzle-loaders caused incessant difficulties and accidents with the ever increasing weight of shot and charges, and did a good deal of harm; in spite of all trouble that was taken and of all experiments that were made a satisfactory solution could not be found, and moreover the guns were quickly worn out. The small-grained black powder used with smooth-bore guns burned too quickly and acted too suddenly; it was therefore superseded, first by coarse-grained powder and then by pebble-powder, and finally by *brown*, slow burning "cocoa-powder" in six-sided prisms with a hole through the middle; in spite of the increase of calibre and of the heavier charges the initial velocity of the projectiles of the short guns kept on diminishing from 1430 ft. with the 7 inch calibre to 1210 ft. with the 12 inch calibre. With the "Inflexible" at last they went so far, that that gigantic vessel of 11,880 tons was armed with only four guns placed in turrets in pairs; but these were 80 ton guns of 16 inch calibre, firing a projectile weighing nearly 1700 lbs.

In spite of the difficulties in the employment of muzzle-loaders growing more and more numerous, and of the increasingly favourable

results gained with breech-loaders in France and in Germany, the War Office, which at that time still had charge of the ordnance of the navy, adhered to muzzle-loaders up to 1880. Then at last it was induced to make trial of Armstrong's newly constructed, heavy breech-loaders the excellence of which had been proved two years previously. The results now obtained at once led them to return to the *System of Breechloaders*,—adopting the French lock as previously they had adopted French rifling. They now built a 14 ton 8 inch gun, and then in rapid succession the other heavy guns still in use of 29, 45, 67, and finally 111 tons, according to the Armstrong system adopted at Woolwich, viz: steel internally with wrought iron coils, as per following table:

Calibre in inches	Nett Weight of gun in tons	Length of bore in calibres	Weight in lbs. of		Initial velocity in feet	Power of Penetration through wrought iron muzzle in inches
			projectile	charge		
16	110½	30	1795	897½	2086·6	38
13½	67	30	1274½	629	2014·4	33
12	45	25¼	712	257½	1912·7	26·7
12¹	46	35½	849	?	2401·6	38·5
10	29	32	500	251	2040·7	26·7
9·2	22	31½	378·4	165	2034	24·4
8	14	29½	209	118	2149	22·8

¹ A wire gun.

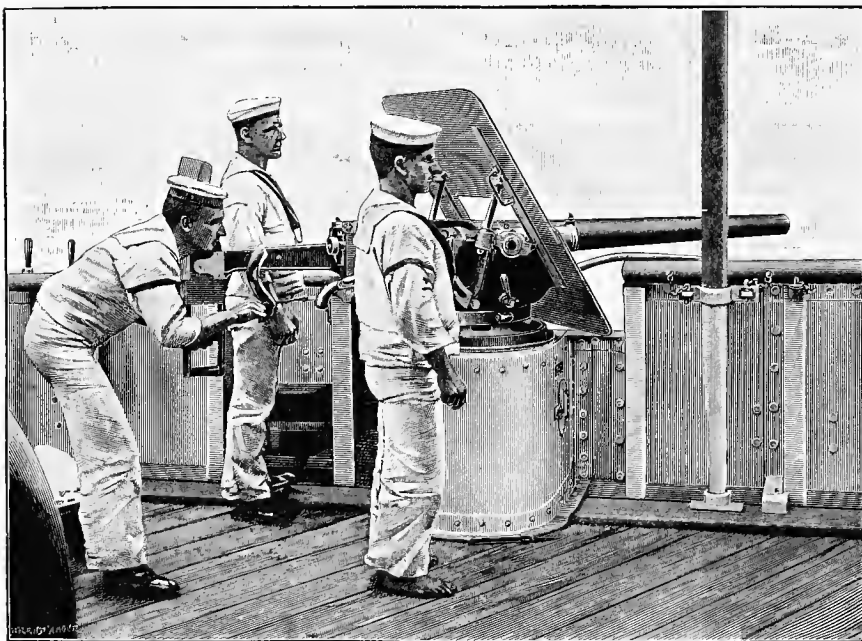
The first battleships that were armed with breech-loaders were the "Colossus" and the "Edinburgh", both in 1882.

The 110 ton, 16¼ inch guns supplied by Armstrong were placed only in three ships, the "Sanspareil", the "Benbow", and the ill-fated "Victoria" lost in 1893, as they were soon found to be at fault. Although the guns of the ship were ordered as early as 1883, yet the "Sanspareil", ready in every other respect in June 1890, had to wait another year for her guns.

Some missed fire, in some the carriage gave way, the long tubes bent out of the straight as much as 2½ inches, one gun was damaged at the muzzle on being fired, so that a piece had to be cut off, and the duration was assumed to be only 75 to 95 shots. Add to this that the gun, independent of the carriage, cost no less than £16,830, and every single shot with a full charge cost, inclusive of the wear

and tear of the arm, £327. The 67 ton gun of 13½ inch calibre turned out a success on the whole, but it cost £10,900 and a single shot fired cost about £165; it is too heavy to be worked by hand. The 45 ton 12 inch gun which may possibly be worked by hand costs £6300, and each shot costs £100.

Ever since 1875 HYDRAULIC POWER was employed in working and moving the heavy guns; first on the "Thunderer", where it was utilized also in moving the turrets. The mechanism introduced by

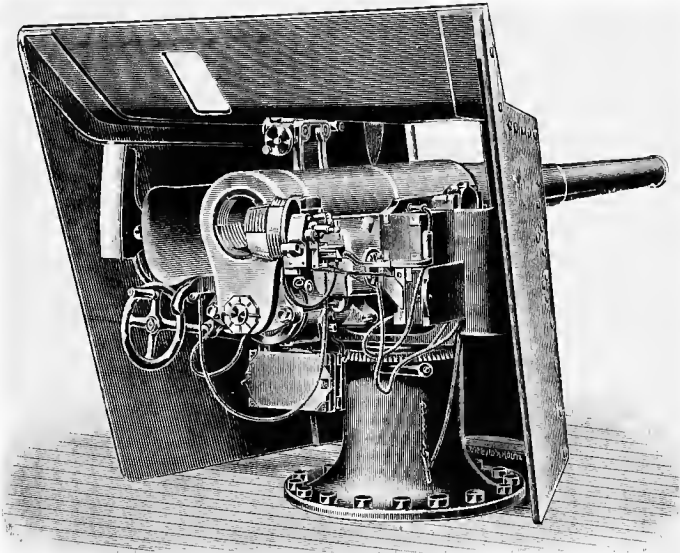


Six pounder, 2¼ inch quick-firing gun behind armour shield.

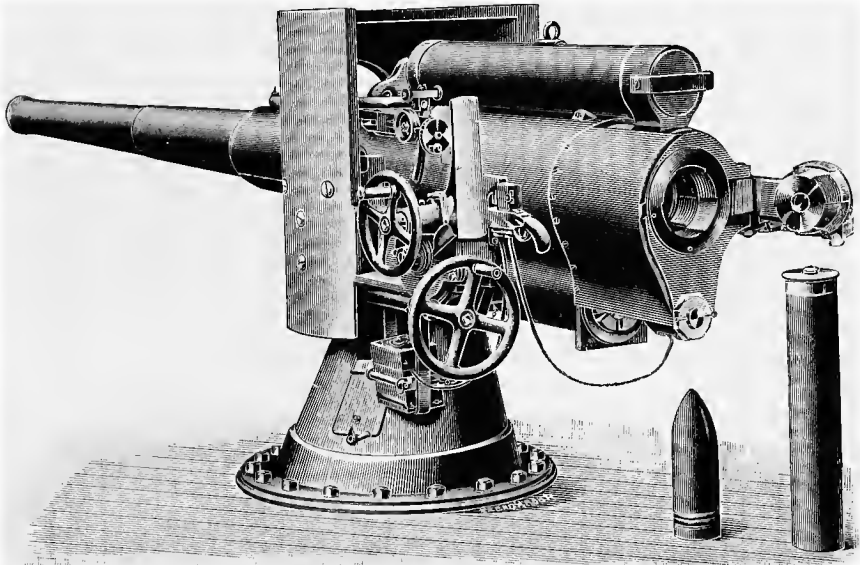
Weight of gun 3 tons, of shell 5 lbs., of charge 7½ oz. cordite.

Messrs. Armstrong proved very efficient for the purpose and was so widely adopted, that by 1895 it was introduced on more than 30 ships. Next STEAM-POWER was introduced on the new battle-ship, "Centurion", for hoisting shot, revolving the turn-tables, and working the guns, but in such a manner, that in case of need working by hand should still be possible; a point of considerable importance in case of derangement of such complicated mechanism. Of late, ELECTRIC ACTION has begun to be employed.

For centuries and up to 1864 the clumsy wooden *gun-carriage* with blockwheels had been in use, requiring 14 men to work a 32 pounder.



Four inch quick-firing gun; opened, behind armour shield.
Weight of gun 21 cwts., of shell $2\frac{1}{2}$ lbs., of charge 4 lbs. cordite.



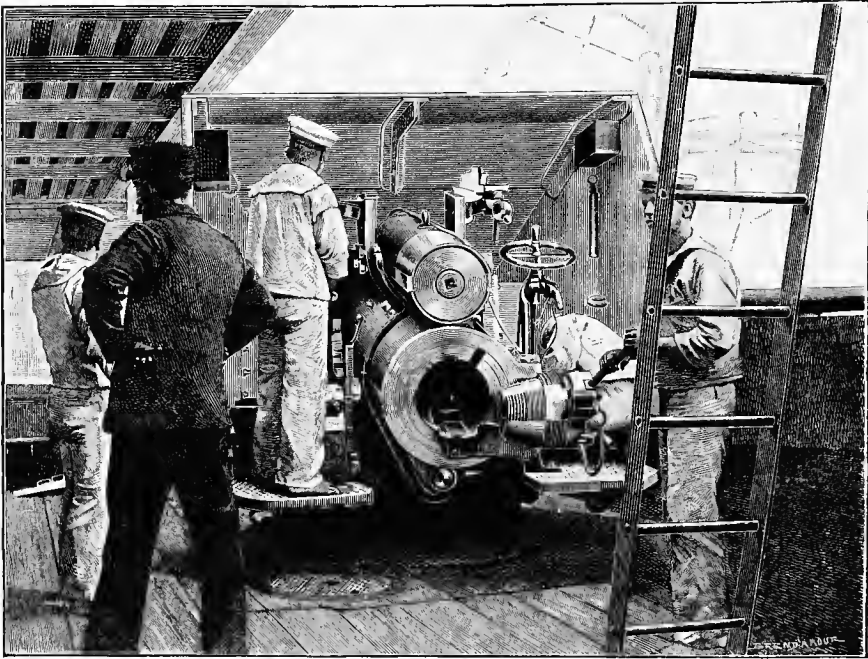
Five inch quick-firing gun, opened.

Then the iron-frame gun carriage with bow and plates invented by Admiral R. Scott was introduced; it turned out a success and is

still in use. The bow compressor was subsequently superseded by the compressor brake, which in its turn was replaced in the "Téméraire" by the HYDRAULIC BUFFER.

In 1882 this also was improved by the gradually closing valve originally invented by Vavas seur. Now no more than half the former number of men is required for the working of a gun. In the building of gun-carriages the English navy has taken the lead.

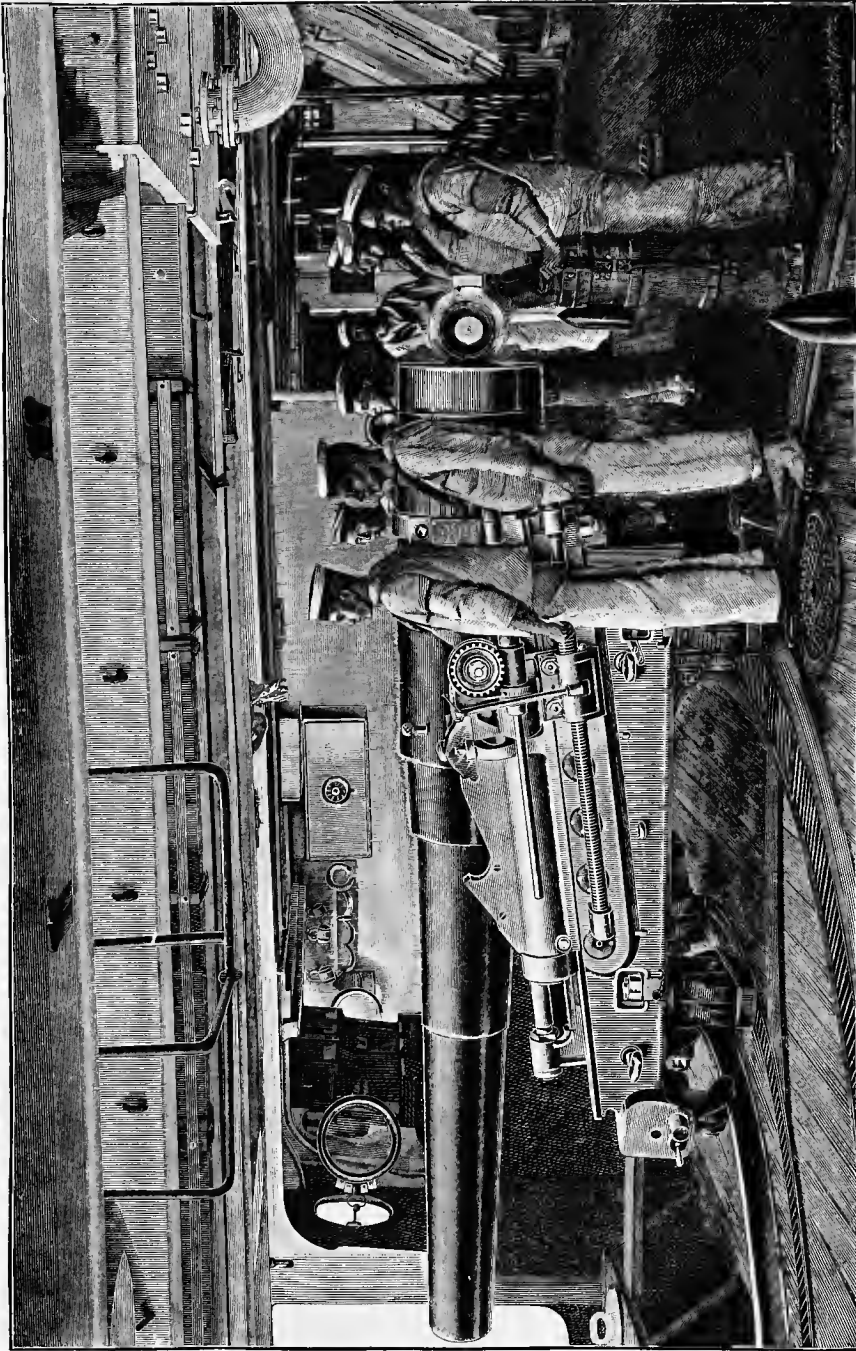
The fine-grained black powder, used with the smooth bore 68 prs.,



Six inch quick-firing gun in armoured casemate on the upper deck, back view.

Weight of gun 7 tons, of shell 100 lbs., of charge 13 lbs. cordite.

turned out to be too rapid of combustion for rifled guns; the powder which burnt more slowly was therefore tried; first *coarse grained* black powder, then in succession pebble powder, and *prismatic* powder, and finally, towards the end of the sixties, brown powder, consisting of hexagonal prisms with a hole through the middle; it was called COCOA-POWDER from its resemblance to compressed cocoa. Messrs. Abel and Noble had for some years been making experiments at the Woolwich Arsenal to produce *smokeless powder*. At last in 1889/90 they succeeded so far that, subject to further trials, their



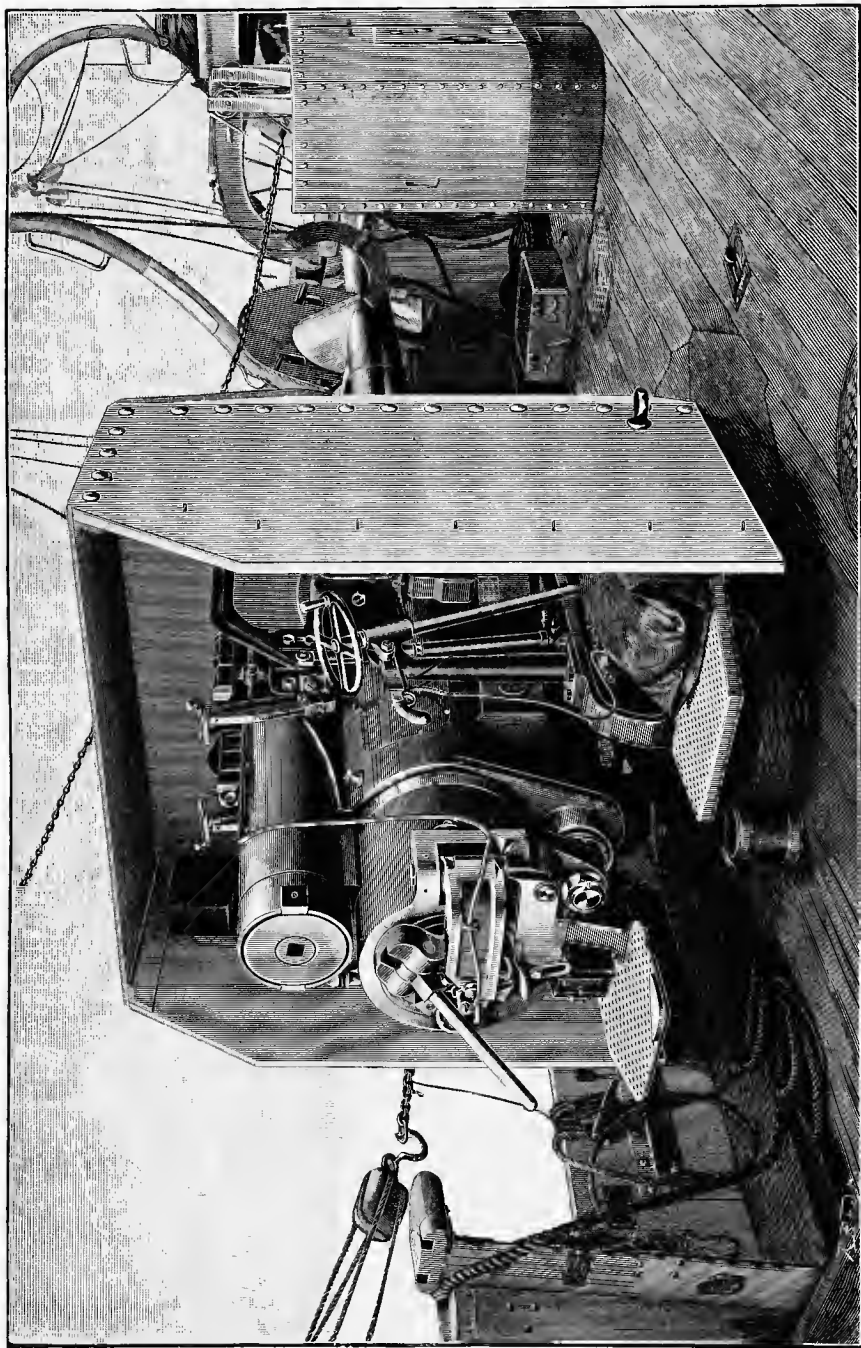
Six inch breech-loader in broad-side gun-port on battery deck.

Weight of gun 5 tons, of shell 100 lbs., of charge 48 lbs.

powder was adopted for the 4·7 inch quick-firing guns. It is called "*Cordite*" from its shape resembling cord or string, which is peculiar to it. In the trials both under tropical heat and in the most rigorous winter cold, and also in the ammunition rooms on board, this powder gave excellent results. Moreover, after firing from a 4·7 inch gun 1219 shot with full charge, the gun had suffered no more than it would have done with common powder. After further satisfactory trials in 1893 with a 6 inch gun, it was adopted for this calibre on the cruiser "*Spartan*", and finally for all *quick-firing guns*. A charge of cordite weighs less than half that of common powder. With heavy guns cordite has not yet been employed.

In the manufacture of *quick-firing guns* Armstrong had led the way independently, without receiving any support from government. In 1886 he exhibited to the officers of the gunnery schoolship at Portsmouth a 4 $\frac{3}{4}$ inch quick-firing gun, which was warmly recommended by the then Captain Fisher, principal of the said training ship (at present Vice-Admiral and Controller of the Navy). In view of the great number of torpedo-boats built in France and in Russia, and of the unique nature of the armament of many English battle-ships—the "*Inflexible*", for example, carrying only four gigantic guns in closed turrets, which are quite unable to repulse an attack of a torpedo-boat—it was simply impossible to refuse adopting these quick-firing guns. It is true that Gatling, Gardner, and Nordenfeldt machine guns were already in existence, that hundreds of 1·8 inch and 2 $\frac{1}{4}$ inch revolving or quick-firing guns of small calibre by Hotchkiss & Nordenfeldt had already been ordered in the spring of 1885 both for battle-ships and cruisers, that these, although of varying construction, could still be worked with uniform ammunition and cartridge; nevertheless it was impossible to dispense any longer with quick-firing guns of greater penetration and range, seeing the enormous rapidity with which torpedo-boats deliver their attacks.

Accordingly the 4·7 inch quick-firing gun of Armstrong was adopted, but the 6 inch gun was only adopted in 1892, after further severe trials. Since that date guns of these two calibres have constituted the chief armament of cruisers and the secondary armament of battle-ships. With what rapidity the new armament of the fleet was carried on can be seen from the fact that, as late as 1886, it possessed only 450 breech-loaders and 33 quick-firing guns, whilst in 1892, that is only 6 years later, it possessed 1868 breech-loaders and 1700 quick-firing guns, 582 of the latter being of 4·7 inch and 6 inch calibre. The accuracy

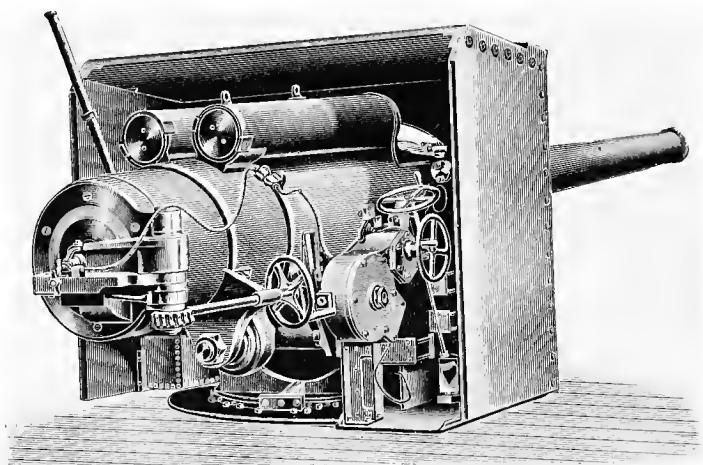


Six inch quick-firing gun in armour casemate on the upper deck.
Weight of gun 7 tons, of shell 100 lbs., of charge 13 lbs. cordite.

of aim of the 6 inch quick-firing guns was demonstrated on the "Royal Arthur", the flagship of the Pacific squadron, at the usual three-monthly firing practice. Whilst the ship was travelling at the rate of 8 knots an hour a target, 6 yards by 3 yards, was aimed at from a distance of from 1400 to 1600 yards. Within 3 minutes 18 shots were fired, and 14 of these struck the target. The rapidity of firing is as follows:

the 6 inch quick-firing gun fires . . .	6 shot	} per minute.
" 4 $\frac{3}{4}$ " " " " " " . . .	12 "	
" 3 $\frac{3}{4}$ " " " " " " . . .	14 "	
" 3 " " " " " " . . .	20 "	
" $\frac{1}{2}$ " Maxim machine gun fires .	300 "	

The 6 inch breech-loaders on cruisers have frequently been converted into quick-firing guns, but the cost of conversion amounts to two thirds of the price of a new gun. Heavy quick-firing guns have not been introduced in the navy, although Armstrong has for some time been making them as well as good gun carriages; these have been tried for the armament of ships and are used by foreign governments.

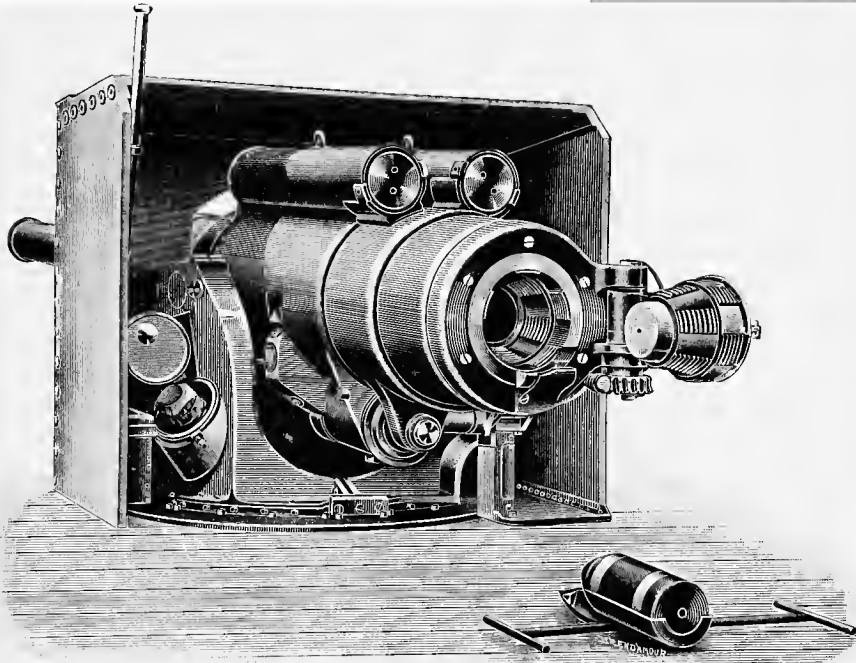


8 inch quick-firing gun made by Armstrong, placed behind armour shield; closed.
Weight of gun 15 $\frac{1}{2}$ tons, of shell 209 lb., of charge of cordite 44 lb.

The defective organisation of the ordnance department used to cause many inconveniences; for example new ships had often to wait a long time for their guns, and so on. This was finally remedied in the latter eighties, the votes for the supply of ordnance for the navy

being included in the naval estimates and placed under the control of the Admiralty. Private works were now employed to a larger extent, and in many other respects improvements were effected.

It had long been admitted that heavy guns should be constructed on Longridge's method; these are the so-called WIRE-GUNS, and ever since 1882 the principle has been accepted that STEEL is the only MATERIAL FIT FOR THE MANUFACTURE OF GUNS; but not till 1891 did they begin to make wire-guns in the Woolwich arsenal according



Eight inch quick-firing gun, behind armour shield, made by Armstrong, opened.
Weight of gun 15.5 tons, of shell 210 lbs., of charge 44 lbs. cordite.

to the so-called Woolwich process. These guns are internally of steel and firmly wound round with very durable rectangular $\frac{1}{4}$ inch steel wire and of $\frac{1}{8}$ inch in cross section. The extraordinary power of these guns can be seen from the table on page 269; the 46 ton gun has greater penetration than Armstrong's gun of 111 tons.

When hardened steel armour was introduced and none but STEEL PROJECTILES proved effective, there arose a great demand for armour-piercing projectiles of steel. Woolwich arsenal, albeit that it is so extensive and efficient, still does not manufacture steel, but draws the

supply it needs, for example for the interior lining of guns, &c., from large private firms, such as Whitworth, Firth, Vickers and Cammell. Consequently the arsenal was unable to manufacture the required armour-piercing projectiles, and the said private firms being equally unable to supply the need, the War Office having done nothing in that direction, the Admiralty was under the necessity of employing foreign makers. Since that time this has been altered, and the firm Firth and others construct excellent steel projectiles. At present the fleet uses four different kinds of projectiles.

E. Mines and Torpedoes.

1. MINES.

The idea of inflicting injury on hostile ships by submarine action is not new; as far back as 1692 Papin had described a submarine craft fitted for rising and sinking, and provided with motive power, rudder, apparatus for renovation of the air, and WEAPON OF ATTACK. In 1771/75 Bushnell, an American, built a small craft of that kind propelled by a screw, worked by one man only, and in the War of Independence he made an attempt to destroy an English man-of-war, but without success. In 1801 Fulton, the inventor of steamers, being encouraged by Napoleon, built the "Nautilus", a larger craft of similar kind, and experimented with it upon a vessel placed for that purpose in the roadstead of Brest. He succeeded in blowing it up, but found it impossible to get near an English man-of-war. Submarine mines—then called torpedoes from the electrical eel, which discharges electric shocks on being touched—were employed first by the Russians in 1854 in Kronstadt, then in 1859 by the Austrians in Venice, and in 1864 by the Danes in Alsen sound. They all proved ineffectual, but still the explosion of a mine in Kronstadt between two English ships was not without considerable moral effect. But in the American War of Secession mines became of great importance in maritime warfare. In 1862 the Confederates established a "Torpedo-bureau" under Captain Maury, the famous hydrographer, which quickly developed the systematic employment of mines, in spite of the lack of means of every kind. Seven ironclads and eleven wooden vessels of the Northern States were destroyed in the course of the war, and many others were put *hors de combat*. Most of the mines were contact mines moored, charged with 50 to 55 lbs. of powder, or mines fixed

to poles charged with about 25 lbs of powder; subsequently mines were constructed which contained 2000 lbs of powder and were to be fired by electricity. Repeated attempts were made to let mines drift down stream against the enemy's ships, but with small effect, except on one occasion; some boats were, however, destroyed by SPAR TORPEDOES and torpedo-boats.

These results led to the introduction of marine mines in all navies, and to experiments with torpedoes with respect to their construction, explosions, firing, moorings, &c. In 1863 a Torpedo-Commission was appointed in England, and since that time great care and attention has been bestowed by the English on all matters connected with torpedoes. In 1874 the "Oberon" an old, iron, paddle-steamer was used to test the effect of gas tension in the explosion of mines charged with from 30 to 500 lbs. of damp gun-cotton; this was continued in subsequent years, till at last the ship was destroyed. On the basis of these experiments the adoption of damp gun-cotton for the charge and of dry gun-cotton with fulminating mercury for the detonation was determined upon and the proportions of these explosives were fixed for the different purposes.

The HARBOUR-DEFENCE in the more restricted sense, and consequently the preparation and maintenance of minefields in the home waters and in the naval ports, is in charge of the corps of engineers of the army, who have large resources at their disposal; nevertheless the *personnel* of the navy, and especially the torpedo-men, are carefully instructed in all that concerns mines, as they might easily have to protect some *foreign* port or base of operations selected for some special purpose; or they may have to block up some foreign waterway by a distribution of mines, or *remove* mines for an intended attack on an enemy's harbour. This education then is necessary also for an effective *aggression*.

At present two kinds of mines are in use; one with a charge of 500 lbs. which serves as an observation-mine, and as a counter-mine, and the other with a charge of 70 lbs., is an electro contact mine. The observation-mine is made of sheet iron $\frac{1}{2}$ inch thick; it is cylindrical in shape, 2 ft. 10 inches high and has a diameter of 2 ft. 8 in.; its buoyancy amounts to 100 lbs. It is held in position by a circular mushroom anchor, flat at top and hollow beneath and held by a 2 inch wire cable; it acts destructively over a circular area of 60 ft. in diameter. To lay these mines launches 40 ft. in length are used, and each is able to place 6 mines at a time; some vessels have boats

especially fitted for this kind of work. Assuming the enemy's ship to have 60 ft. beam, a row of six mines placed at intervals of 120 feet would bar a waterway of upwards of 700 ft. wide. The extreme points of the bar are marked by buoys, which are all that is visible; to mislead the enemy other buoys are scattered about in the neighbourhood. When the enemy's ships pass between the buoys at the extremities of the line of mines, these are fired by pressing the button of the electric firing apparatus. The most convenient depth for the position of the buoys is considered to be 50 ft. beneath the surface and 12 ft. above the electric cable, because this latter is easily destroyed prematurely by the explosion.

The CONTACT-MINE with a charge of about 70 lbs. of damp gun-cotton—which is sufficient to destroy the strongest ship—is also made of iron, cylindrical in shape with rounded-off edges. The mines laid out are connected with the shore by electric cables, and can at any time be made harmless by breaking the current. But if this is not done, the enemy's ship on driving against the mine causes it to tip over about 70°, and this produces an overflow of quicksilver, which completes the circuit. These mines do not have fuses with outside detonators. The contact-mines are laid at a depth of 10 to 15 ft. beneath the surface of the water, with fixed anchor-cables of corresponding length; a suitable method for an automatic adjustment of the mines to keep them at uniform depth at all stages of the tide has not yet been invented. The contact-mines are also used as scattered mines, but if so employed the electric battery is inserted in the mine; the ends of the electric wires are kept asunder by melted sugar, which is allowed to grow hard again; by the admission of water the sugar is gradually dissolved, after the mine has been laid. Nevertheless care must be taken in laying the mine that it retains its upright position, and in no case may it heel over to an angle of 70°. All ships are supplied with contact-mines, and the laying of mines forms part of the drill even in the school-squadrons; it is consequently carried out with great rapidity.

Considering the *importance of mines in maritime warfare* provision is also made to extemporise mines, be it for lengthening a regular bar already laid, or for independent use. They are made of casks, which are stiffened inside and outside, and thickly coated with tar; these, however, cannot be laid at a greater depth than about 70 ft., as the casks leak under greater pressure of water; the charge consists of gunpowder, as the ships have no store of gun-cotton on board.

A cask of about 50 gallons contains nearly 500 lbs. of gunpowder and can withstand waterpressure at a depth of 30 to 35 ft.; one of 25 gallons contains about 225 lbs. of gunpowder, and withstands a pressure of between 60 and 70 ft. of water. The explosion is effected in the same manner as with the regular mines of contact and scattered mines. SMALL MINES also to be fastened to submerged poles are provided.

Great attention has been bestowed on DESTROYING, OR EFFECTING A BREACH IN, AN ENEMY'S LINE OF MINES and three different systems are in vogue.

When the enemy keeps his line of mines under fire the system of *simplest* application is destruction by counter mines, each containing a charge of 500 lbs. of gun-cotton, twelve of which form a line. They are placed together with three mark buoys on a launch, loaded with 4 tons of iron ballast and carried on planks resting on the gunwale like outriggers ready to be dropped overboard. The launch is then dragged full speed by a steam-tug across the bar, the mines being let drop one by one by breaking the stoppers; as soon as all have been dropped a signal is given (at night by a rocket) and the whole line of mines is exploded, which in their turn cause the enemy's mines to explode and thus a breach in the bar is formed. The *second* system, "*sweeping*", is employed, when the enemy does not keep the bar under fire: it is too complicated to be here fully described, but the general principle is, that two boats drag a cable about 40 yards long and provided with drags and with explosives at the extremities; this cable is swept along the bottom right athwart the water-way up to the point where the field of mines is placed. The cables, &c. of the enemy's mines are grappled and destroyed by firing the explosives. The *third* system, "*CREEPING*", is not employed to destroy the enemy's mines, but to search for and cut their cable; for that purpose a SPECIAL APPARATUS is carried requiring drags and 2 lbs. of explosives. The boat engaged in that kind of work travels along the shore, where the enemy's observing station lies or is supposed to lie; grapples the cable and severs it by exploding the charge. The ships are also provided with explosives calculated to destroy anchor chains and booms.

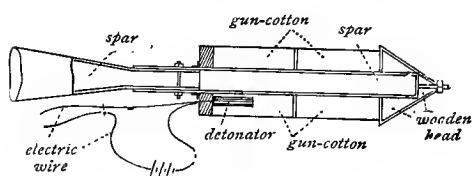
The Intelligence Department is kept steadily and accurately informed of all the arrangements and contrivances for booms made by foreign nations, and it elaborates plans of attack even in times of peace. There is no doubt that when the occasion should arise *an English fleet*

would immediately on appearing before an enemy's port explode, counter-mines, make a gap in the enemy's torpedo-defence and proceed to a vigorous attack. English naval officers have never been deficient in pluck in dangerous enterprises. It will be advisable not to rely too confidently on the protection afforded by lines of mines.

2. SPAR-TORPEDOES.

The SPAR-TORPEDO, i. e. a small mine or charge fixed at the end of a long pole or spar was used with great success in the American War of Secession as a *weapon of attack*, especially by Lieutenant C. Cushing of the Northern States, who sank the iron-clad "Albatross" in an audacious attack by night. In 1884 the French also under Admiral Courbet made good use of this arm at Fuchow against the Chinese. Although this weapon is not without danger to the aggressor, yet being simple and very formidable, the English have devoted great attention to it, have introduced it into their navy, and retained it to this day.

Spar-torpedoes are employed mainly by steam-pinnaces 40 to 50 ft. long. The equipment consists of six spars about 40 ft. long, 5 to 8 inches thick, the end to receive the torpedo being mounted with iron. The torpedo is made of sheet iron, is cylindrical in shape, and charged with 33 lbs. of damp and $2\frac{1}{2}$ lbs. of dry gun-cotton, and fitted to be fired by electricity. The spar lies forward in the boat



Spar-torpedo.

on a small block on rollers. At a distance of about 60 yards from the enemy the command is given "Run out", and the spar is pushed forward to the extreme end, and the point then naturally dips under the water. On being

fired the torpedo should be at least 10 ft. under water and 30 ft., measured horizontally, distant from the boat. On contact with the enemy's ship the explosion is to take place as near as possible under the engine-room. The spar broken by this operation can be replaced by another.

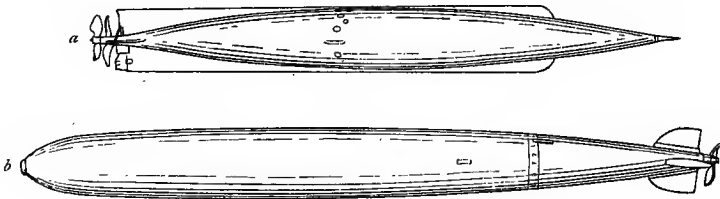
3. TORPEDOES.

Of the numerous torpedoes that have been invented, some even in England, the War Office has selected for coast-defence the BRENNAN-

TORPEDO, having purchased it from the inventor, an Australian clock-maker for £150,000. The first model was exhibited by Brennan in 1877; it was cigar-shaped, set in motion and steered by electricity; subsequently it was greatly improved by him and by English Engineer officers. The Brennan-Torpedo at present in use was perfected in 1887; its charge weighs 200 lbs. and it is said to be very effective.

In the navy the WHITEHEAD-TORPEDO only is employed; after numerous experiments, it was bought by the Admiralty for £15,000; it was afterwards perfected with utmost care and then introduced into the navy. It travels at the rate of, from $8\frac{1}{2}$ knots for a distance of about 200 yards, to 28 to 29 knots for 900 yards; its charge is from 60 lbs. to 200 lbs.; the deflection sideways on being fired above water is 30° , the speed of the vessel being only 9 knots; at the rate of 18 knots this deflection is diminished to 3° or 4° . The arm is manufactured in England in three different places, viz: in Woolwich arsenal, in Whitehead's factory at Portland, and at the works of Greenwood and Batley in Leeds. The great requirements of the fleet keep all three fully employed. It has happened that the Admiralty has ordered 420 torpedoes all at once. The cost is about £350 a piece.

In consequence of the numerous improvements and alterations that have been made, there are no less than 24 different sorts of Whitehead-torpedoes in store, 19 of which are for above-water tubes. All



Whitehead-torpedoes.

- a. Older model with pointed head and longitudinal fins.
- b. Present model, mark VIII, with blunt head.

are cigar-shaped 14 to 19 ft. long and 14 to 18 inches in diameter. At first the head was made to end in a sharp point, but a blunt form was subsequently found to be more suitable. The model mark VIII most commonly employed in the newest ships, has this shape. The longitudinal fins originally attached above and below the torpedo have been abandoned and replaced by two upright rudders.

The torpedo is fired off either by compressed air having a pressure

of 300 lbs. to 600 lbs. pr. square inch,¹ or with 4 to $4\frac{1}{2}$ oz. of powder; submerged torpedoes are fired off only by compressed air, lateral deflection of the head of the torpedo being counteracted by a guiding rail pushed out to the front. In France this deflection now amounts at most to 7° to 15° . With the revolving tubes of torpedo-boats, only powder is used for firing; of late they have been using cordite. The second class torpedo-boats, and the pinnaces fitted up for the use of torpedoes do not carry the torpedoes in tubes, but the torpedoes are suspended lengthways on dropping-gear at the sides. By opening the claws and the stopper which restrains the engine, the torpedo is urged forward by its own mechanism.

Careful account is kept of every torpedo, and the torpedo crews are trained with the greatest care. Once every three months firing practice is engaged in by all the vessels fitted with torpedoes. *From every tube four shots are fired*, two when the ship is at rest, and two when it is in motion. Each torpedo tube is worked by a crew of six men.

4. MISCELLANEOUS.

The FIRST TORPEDO-BOAT was built in 1873 by Messrs. Thornycroft, not for England but for Norway; she displaced $7\frac{1}{2}$ tons and ran 15 knots. Not till four years afterwards did the Admiralty order a torpedo-boat, the "Lightning"; she was 85 ft. long, displaced 27 tons, and attained the surprising speed of 19 knots; she was intended for spar-torpedoes, not Whitehead's. This was followed in 1877/78 by the first dozen of torpedo-boats, of which that supplied by Messrs. Yarrow & Co. attained a speed of nearly 22 knots. Subsequently, however, from distrust of the Whitehead torpedoes, whose accuracy of aim left much to be desired, the Admiralty advanced with halting steps, and allowed itself to be outstripped by foreign navies, as has already been mentioned under head a. (page 245).

As a protection against torpedoes *Bullivant's torpedo-nets* were introduced. They consisted of pieces of strong netting 15 to 20 ft. long, made of steel rings and steel wire and joined together so as to enclose the whole ship.

The net is held at a distance of 9 to 10 yards from the sides of the vessel by hollow steel spars. But Captain Wilson of the torpedo-school-ship, "Vernon", has invented a so-called NET-CUTTER, which

¹ One kilogram pressure on one square centimetre = 14.7 lbs. pressure on one square inch = one atmosphere. A remarkable and very useful property of the metric system. The translator.

makes a clean cut through the net, even if it strikes it obliquely, and thus renders this apparently powerful protection very unreliable.

An equally unreliable protection on board against the insidious attacks of torpedo-boats is the SEARCH LIGHT; nevertheless they are in use not merely in all the ships, but also in torpedo-boat destroyers, in torpedo-boats and even in picket-boats. The search lights can be used with advantage in lighting up the entrance into port, and on board ship for signals at night. It is said that with a clouded sky the bright gleam is visible at a distance of no less than 60 miles.

The first English ship armed with the RAM was the "Bellerophon", built by Sir E. Reed in 1866; the ironclads "Valiant" and "Agincourt" previously built had indeed something like the ram, but it was very rudimentary. At present it is usually found on all battle-ships and even on large cruisers.

The SMALL ARMS in use are: the Lee-Metford magazine rifle of 3 inch calibre for smokeless powder, carrying 10 cartridges in the magazine. The length of the rifle is 50 inches, and inclusive of the sword bayonet it weighs $10\frac{3}{4}$ lbs. The barrel has seven grooves, the projectile weighs 216 grains and the charge 30 grains; the initial velocity is about 2200 ft, and it can be sighted to a distance of nearly 3000 yards. This rifle is made in the Royal arms factory at Enfield and costs £3. 16. 6.

There are also in use three kinds of revolver, and the cutlass, which is a short broad sword with a large hilt.

F. The Strength of the Navy.

THE MATERIEL OF THE NAVY has been completely changed during the last 40 years; of the vessels of those years, but few are still in existence, and even these have for some decades been employed in mere harbour-duty.

In 1860 the fleet consisted of 518 ships, inclusive of 153 gun-boats 121 vessels, &c. for harbour service, and 47 small craft for the coast-guard. Of this number 314 ships, &c. were in commission, 202 of them being on 10 foreign stations, the China station being the largest of them, and 112 vessels were employed on harbour-duty or on other special service. The Mediterranean Squadron numbered 41 ships, the Channel Squadron 19, and amongst them not a single iron-clad. There were building 38 large ships, 13 of which were still wooden screw-propelled ships-of-the-line of 91—131 guns, and 7 frigates of 51 guns.

A small number of armoured vessels partly wooden and partly iron formed the nucleus of the NEW NAVY. The reorganisation of the *personnel* was taken in hand in 1852; it was carried out zealously and systematically, but not yet quite thoroughly. Permanent practice squadrons had been kept up for some years in the Channel and in the Mediterranean.

In 1868 the number of large iron-clads had risen to 28 of various types, and of smaller iron-clads there were 8 corvettes, 8 monitors and a few floating batteries. Of unarmoured ships there were 55 screw-propelled ships-of-the-line, 34 frigates, 52 corvettes, 63 despatch boats, 99 gunboats, 19 troop-ships and finally about 100 sailing vessels. Iron-clads were first put in line with the practising squadrons in 1866, but they did not join the manœuvres successfully.

By 1876 the ironclads had been increased to 49 ships, and three more were being built. Among these were 14 wooden ships of doubtful utility, which were quickly worn out; also 11 monitors and small vessels, and 10 obsolete iron battle-ships no longer fit for battle. Of useful battle-ships there were 12, and 2 rams; for a fight near home 5 monitors could have been brought up besides. Even then, that is 21 years ago, the "Hercules", the prototype of the German "Kaiser" and "Deutschland" was in England *no longer considered as fully up to the mark for battle*. In consequence of the rapid waste and of the rejection of wooden vessels and gun-boats, the number of ships in the navy was largely reduced.

The NAVAL DEFENCE ACT gave a mighty impulse to the increase of the number of ships, or more correctly to a *renewal of the navy suited to the times*.

In the summer of 1896 the strength of the navy consisted of: 13 new ships built since 1889, 32 older vessels, which were still fit for battle, part of them being mighty battle-ships; 17 of these had however still muzzle-loaders for heavy ordnance, but all of them were supplied with 20 to 30 quick-firing guns; also 29 first class cruisers, inclusive of 9 obsolete ones, like the "Warrior" and the "Nelson", mainly armed with muzzle-loaders, whilst the other 20 were all new; also 41 second class and 39 third class cruisers, one third of which were of an earlier date than 1885, and all provided with protective decks; moreover 16 unprotected cruisers of various sizes; 15 iron-clads and rams for coast-defence from the years 1863—79, mostly armed with muzzle-loaders for their heavy ordnance, but one half of them still serviceable for battle near the coast; 35 rapid torpedo-craft, 42 torpedo-

boat destroyers, and 101 first class torpedo-boats. There were building: 12 first class battle-ships of 12,950 tons to 14,900 tons, 10 first class cruisers of 11,000 to 14,200 tons, 12 second class cruisers of 5600 to 5700 tons, 7 third class cruises of 2135 tons, all with protective decks and 48 torpedo-boat destroyers of 300 to 400 tons. These are the classes of ships, of which the fleet intended for battle will ere long be exclusively composed; battle-ships of other than first class and unprotected cruisers are no longer being built in England and but few torpedo-boats.

According to the estimates of 1897/98 there are yet to be added to the above numbers: 4 large battle-ships, 3 third class cruisers, 12 river gun-boats of shallow draught, that can be taken to pieces and are to be used for special purposes and 2 torpedo-boat destroyers, which are all to be finished at latest by the year 1900. Considering the extraordinarily great resources of the Royal yards and private factories in England, there is no doubt whatever that the ships will be ready within the specified time. In the year 1900 the fleet will possess 29 first class battle-ships, 21 first class, 45 second class, and 26 third class cruisers as well as 92 or more torpedo-boat destroyers, *all perfectly new and built since 1880.*

In a few years then the English navy in active service will consist of none but modern ships up to date; the battle-ships without exception of largest type, and the cruisers also, superior in size and number to those of corresponding class of all other nations; the torpedo-boat destroyers, one hundred or more in number, of unapproached speed and fitted by day to go in search of the enemy's torpedo-boats in their own waters, or by night to encounter the advancing torpedo-boats of the enemy and to destroy them.

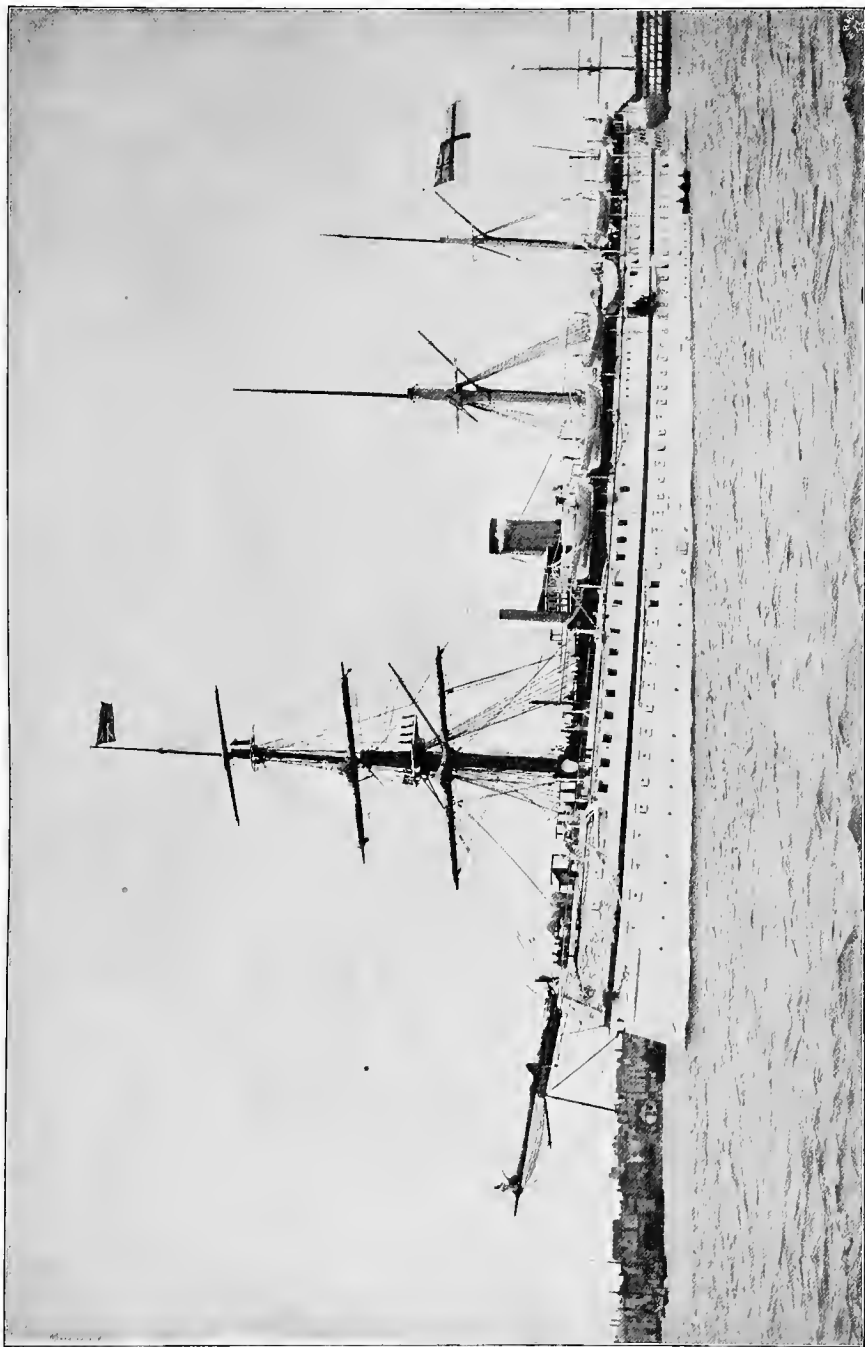
For *war in the home waters* there would yet have to be reckoned with: 30 to 40 older iron-clads and monitors, about 30 torpedo gun-boats, and finally about 100 first class torpedo-boats, built between 1877 and 1896; 28 of these are of 130 tons, and with from 360 to 2690 H.P. they make 17 to 24 knots. Barring No. 93 they are all propelled by single screws, and 3 have water-tube boilers. Of course, for the purposes of war the older boats are of comparatively slight value.

The ninety torpedo-boat destroyers built between 1893 and 1896 are of 240 to 300 tons and are propelled by twin screws. The boilers are of seven different types-locomotive; and six types of water-tube boilers; of French types only the Normand type is represented. Of torpedo-tubes, all of which have a calibre of 18 inches,

the six oldest of the "Havock" type have a fixed tube in the bow and a double revolving tube on deck; they are armed with one 3 inch and three 2·2 inch quick-firing guns. All the others are provided with two simple revolving tubes on deck, one 3 inch and five 2·2 inch quick-firing guns. The engines have been raised from 3100 H.P. to 6000 H.P. and are to be still further augmented to 10,000 H.P. The original speed of 27 knots has been raised to 30 knots and is to attain 33 knots. The destroyers are supplied with search lights, and their crews number from 45 to 68 men.

Of second class torpedo-boats there are existing 76 of the years 1879/96, of 12 to 16½ tons displacement, 120 to 130 H.P. and 12·6 to 17 knots speed; they are all propelled by a single screw. Nine of them are built of wood and fitted for spar-torpedoes. These craft are not suited for sea-voyages, but two TORPEDO DEPOT-SHIPS have been fitted out, so as to utilize these torpedo-boats also at sea. One of these the "Hecla" is an old ship, of 1878, of 6400 tons, making 12 knots, and storing 3000 tons of coal in her bunkers; the other is the "Vulcan", a new ship of 1889, of 6620 tons, and 12,000 H.P. making 20 knots; both ships are armed with guns and torpedo-tubes, but they are principally fitted up as workshops for repairs of all kind, which is an indispensable addition to a squadron engaged in warlike operations. Both carry large stores of mines and torpedoes, as well as respectively five and six second class torpedo-boats, and the "Vulcan" has also two large boats for laying countermines.

THE AUXILIARY CRUISERS will prove useful in such warfare as is waged by cruisers. There are eleven of them; they are subsidized vessels of the years 1887 to 1893, and are all transoceanic mail-steamers drawn partly from European and partly from Pacific lines. They are of 7000 to 30,000 H.P. and have a permanent speed of 16½ to 20 knots. The subsidies of the several ships range between £2438 and £7500, and the sum total is £48,620. In addition to these three, other large Steamship-companies have offered their vessels to government in case of war, without receiving a subsidy. These include 17 ships of the years 1871 to 1889, of 3888 to 8128 tons measurement, 3600 to 14,500 H.P. and making permanently 15 to 19½ knots. The Admiralty accordingly disposes of 28 large and swift Auxiliary Cruisers, whose armament lies ready for them partly in home and partly in foreign ports, as for example Hong-Kong. This may be the place for pointing out that the Admiralty have *from the outstart* steadily kept in view the *employment of swift merchant-steamers*



Troop-ship **'Euphrates'**; 5211 tons, 3900 HP. (1886), now sold out of the service

for war purposes. As early as the thirties, when the Admiralty still had a very low opinion of the utility of steamers in battle, they duly recognized the value of *rapid* vessels in war, and made contracts with the first steamship company plying between Britain and Ireland for the eventual employment of their vessels in case of war.

There remain to be enumerated as part of the navy to be employed in service abroad 17 small sloops of the years 1876—1895, of 925 to 1170 tons, 750 to 200 H.P. and making $14\frac{1}{2}$ knots; also 18 first class gun-boats of the years 1885—1889 of 715 to 755 tons, 1000 to 1200 H. P. making 13 knots, and finally two stern-wheel river gun-boats on the Zambesi, of shallow draught, drawing barely one foot of water; these were brought there in sections and put together at the river's mouth.¹

Of DESPATCH BOATS there are extant only two of the year 1885 of 1600 to 1700 tons, 3000 H. P., making 17·8 knots, with a thin protective deck and light armament. *No value* is attached in England to this kind of craft and justly so, as their slight fighting capacity fits them neither for scouting duty, nor for cruising; at best they can be used to carry news, and for that purpose the mercantile navy supplies craft in sufficient number.

For the training of lads and ordinary seamen there are maintained 8 sailing vessels, sloops, and brigs; one of these is in the Mediterranean.

The large steam troop-ships which used formerly to be part of the navy have mostly gone out of use and are no longer extant. The enumeration of other craft for surveys, protection of fishery, of coast-guard service, of tugs and yard craft, of hulks for coals and provisions, which are stationed mostly in home, but partly also in foreign ports, would lead us too far; we will however mention the Royal yachts, the "Victoria and Albert" of the year 1855 (which is accordingly 43 years old), of 2470 tons and making about 16 knots; also the "Osborne" of the year 1870, of 1850 tons, and making 15 knots; finally the Admiralty Yacht, the "Enchantress" of the year 1865 of 1000 tons and making 13 knots; all three being wooden paddle-

¹ These boats are the "Mosquito" and the "Herald," and there is also the "Dove", a side-wheeler. The "Herald" and the "Mosquito" were built in floatable sections, so that they were connected up very rapidly on arrival, thus avoiding the troublesome business of rivetting together and launching. The builders were Messrs. Yarrow & Co. The translator.

steamers. There ought further to be mentioned three floating work-shops and six hospital ships, two of the latter being in Hong Kong.

The governments of India, Canada, and Australia maintain a number of ships, that have some military value. The INDIAN NAVY comprises 2 monitors of the year 1870, 2 torpedo gunboats, and 7 torpedo-boats, 8 troop-ships of 930 to 5000 tons measurement, 2 despatch-boats and 8 river-steamers; they are under the Commander-in-Chief of the Indian Station and commanded by British officers. CANADA only possesses 16 vessels for custom-house-, hydrographic- and survey-service, and for the protection of fishery. The AUSTRALIAN GOVERNMENTS, however, have had built in England 5 third class cruisers of 2525 tons, 7500 H. P. and making 19 knots, as well as a torpedo gun-boat, all for the protection of their own waters; they also maintain the monitor "Cerberus" of 3430 tons, 8 gun-boats, 11 torpedo-boats and two old screw ships. All these vessels are under the command of the Commander-in-Chief of the Australian Station. Finally there is yet to be mentioned the MINING-FLOTILLA. It does not exactly belong to the navy, being under the management of the corps of engineers of the army; but it is of importance for coast-defence. It numbers no less than 102 vessels, viz: 8 rather large steamers of 300 to 620 tons, and 300 to 750 H. P.; 22 smaller steamers and steam-pinnaces of 27 to 165 tons, and 20 to 200 H. P., 4 sailing vessels of 160 to 175 tons, and 68 mine-layers of 15 to 144 tons, mostly without engines, but some have engines of 65 to 295 H. P.

Of serviceable torpedoes there are in all 4000 in store; of these about 950 are in the principal dépôt at Portsmouth, and 350 to 400 in each of the dépôts at Devonport and Chatham, and 20 to 100 in each of the nine foreign dépôts, and their number is being continually increased.

G. Naval Estimates.

The NAVAL ESTIMATES being intimately related to the *matériel* of the navy, we must add a few words about them. At the time of Queen Elizabeth they amounted in times of peace to only £6000; the war expenditure was calculated separately. In 1588, the year of the Armada, the expenditure rose to £90,000, but this did not include the cost of provisions &c., nor the compensation given to the several ports for the ships they had sent into the fight. In the Napoleonic wars the estimates and the *matériel* attained an enormous



Guardship 1st Class

height; the *personnel* had risen to 135,000 men or more; in the year 1809, the fleet numbered 709 ships in commission, inclusive of 113 ships-of-the-line. During the long peace following upon these wars, government allowed those numbers to drop so low as to be incompatible with the duties the navy had to discharge. As early as 1814 there were only 14 ships-of-the-line in commission. The period however of the deepest ignorance of the state of affairs, was after the reform bill had been carried. In 1830 the naval budget still amounted to £4,335,000, but in 1834 it was reduced to £3,060,000, and in 1835—36 still further to £2,800,000. In consequence, the *matériel* of the navy was naturally also largely reduced, causing "scares" from time to time, which jerked the estimates up by fits and starts. Down to the middle of the eighties they remained under £10,000,000, whilst the army cost half as much again or more; for example, in 1886/87, the army estimates amounted in round numbers to 18½ million pounds. With the NAVAL DEFENCE ACT, however, a permanent change set in. In 1893/94 the naval estimates amounted in round numbers to 14½ million pounds; in 1894/95 to 17·7 million pounds; in 1895/96 to upwards of 19 million pounds; in 1896/97 to £21,823,000; in 1897/98 to £22,250,000, and in the current year 1898/99 to £24,733,822.¹

The principal items of these last estimates are:

EFFECTIVE SERVICES:

1. Wages &c. of Officers, Seamen, and Boys, Coast Guard and Royal Marines:	£ 5,105,185
2. Victualling and Clothing for the Navy:	1,921,325
3. Medical Establishments and Services:	190,900
4. Martial Law:	11,427
5. Educational Services:	116,027
6. Scientific Services:	79,629
7. Royal Naval Reserves:	257,113
8. Shipbuilding, Repairs, Maintenance, &c.:	
Section I. Personnel:	2,230,915
" II. Matériel:	3,132,000
" III. Contract Work:	5,649,440
9. Naval Armaments:	2,584,700
10. Works, Buildings, and Repairs at home and abroad:	657,100
11. Miscellaneous Effective Services:	243,127
12. Admiralty Office:	256,700
Total Effective Services £22,435,588	

¹ Exclusive of Mr. Goschen's Supplementary Estimates, the details of which are not yet published. The translator.

NON-EFFECTIVE SERVICES:

	Brought forward	£22,435,588
13.	Half Pay, Reserved and Retired Pay	£764,803
14.	Naval and Marine Pensions, Gratuities and Com- passionate Allowances	£1,104,808
15.	Civil Pensions and Gratuities	£333,323
	Total Non-Effective Services	£2,202,934

EXTRA ESTIMATE FOR SERVICES IN
CONNECTION WITH THE COLONIES:

16.	Additional Naval Force for Service in Australasian Waters.	
	Annuity payable	95,300
	Grand Total	£24,733,822

constituting an increase of nearly $2\frac{1}{2}$ Millions upon last year. If the Supplementary Estimate is added to this amount, the increase will probably be unparalleled in the history of Naval Estimates.

It is probable that the estimates will remain at a great height in subsequent years, seeing that the English nation has adopted the principle that its navy must be superior to any possible combination of two powers, and has made this principle the basis of its maritime policy.

XI. CONCLUSION.

When at the battle of Trafalgar, the navies of the two greatest maritime powers of the day had been absolutely annihilated, and when in the years immediately following thereupon the smaller European navies had been captured, England was absolute mistress of the sea, and the English nation abandoned itself to the enjoyment of that undisturbed supremacy without considering the efforts and sacrifices required for retaining it. All that was aimed at was the exploitation of the great successes of the navy for the increase of trade, industry, and wealth.

Occasional "scares" frightened the nation for a time out of its fancied security, and even the Crimean war had no other permanent effect than to give an impulse to the adaptation of the *matériel* to the requirements of the day. The huge economic expansion and revolution which had taken place in consequence of that very predom-

inance at sea, the enormous increase of manufacturing industry and maritime trade, added to agricultural depression, made the country dependent on its colossal import trade in provisions and raw materials; all these were consequences that had not been foreseen. It may well be assumed that the military events of the two great wars of 1866 and 1870/71, and the political consequences flowing therefrom had roused the attention of a wider circle of thinkers in England, and caused them to reflect deeply on the position of the country. Had this not been the case, General Chesney, for example, would not have created so great a sensation by his "Battle of Dorking", which described the imaginary landing of a German army on English soil. Since then the ball has been kept rolling, and the institution of the Naval Intelligence Department, in 1882, and the passing of the Naval Defence Act in 1889 may be regarded as the two principal stages on the road to the present state of affairs.

The GREAT NAVAL MANŒUVRES, which have taken place yearly ever since 1885, have largely contributed towards forming public opinion, opening the eyes of the nation to the dangers of an enemy's superiority at sea, and enhancing and widening the interest of the people in the warlike capacity of the navy. This end was mainly gained by two parties being opposed to each other in the manœuvres. Although these operations may not have led to any tactical or strategic conclusions, yet they have, in spite of shortcomings in their plans, furnished valuable information about the enforcement of blockades in modern circumstances, about the value and utility of different classes of ships, especially of torpedo-boats and torpedo-boat destroyers, about harbour defence, about the despatch of intelligence, &c. The scouting practice of squadrons of cruisers, to which great value is attached in France as well as in England, merits special attention; it has established the fact that only *cruisers in good fighting condition*, not swift despatch boats, can render useful scouting service in time of war. It is not known, whether any *tactical* principles have been based thereupon, but *strategically* it is undoubtedly settled that the practice followed by the British navy at its most glorious period, of an immediate, resolute, and unhesitating offensive, such as found expression in the famous order: "Sink, burn, destroy", will also be the practice of the future. In principle, the English probably intended to remain true to their great historical traditions, but the half-measures taken by European navies in the wars waged during the last seventy years are in flat contradiction to this maxim.

The return to sound and time-honoured principles has become

decisive for the development of the new navy. In order to carry out these measures, when the occasion arises, detailed plans of attack for all eventualities are worked out in the Intelligence Department and the *matériel* of the navy is adapted accordingly.

It can be foreseen that it will not occur again in the future as it did at the time of the Crimean war, that a great English fleet would appear in the Baltic without knowing what it can do or ought to do. *It will assuredly proceed to an immediate and resolute attack upon important ports, and will not allow itself to be scared away by supposed bars and the like, and merely enforce a blockade at a considerable distance from the coast.*

The creation of a mighty new fleet, such as England has accomplished during the last nine years, does not stand without parallel in history. Colbert, the great minister of Louis XIV., performed an equally difficult task in an astonishingly short time. But while in France this was the work of a man of exalted genius, carrying out the commands of a despotic ruler, the new British navy, which safeguards the interests of the country, *owes its existence to the co-operation of a number of men of correct insight who clearly recognized and steadily kept in view the objects to be aimed at,* each supporting the other and thus advancing the common cause. Primarily the agitation began with officers of the navy and of the army, but speedily statesmen, men of science, merchants, and manufacturers, joined the movement, spread it far and wide, and made it the cause of the people, of the nation. And it was no small achievement to give *persuasive force* to the idea that British naval predominance is an indispensable necessity. This is now admitted right through the country, and it is a power that no one can withstand.

It is impossible to think meanly of the spirit of a nation, of the institutions of a country, of the organisation of a government, which have made such things possible, which have mightily laid hold of such a thought and have energetically carried it out. With the inexhaustible resources at the disposal of the country, the new navy will be created in an incredibly short time, a *political instrument of enormous power*—May English policy ever use it with *justice, wisdom, and moderation!*

English Equivalents of the metric magnitudes occurring in the
diagrams on pp. 249 et sequ.

1 m (metre) = 39·37 inches.
1 cm (centimetre) = ·3937 inches = $\frac{2}{5}$ inch very nearly.
1 mm (millimetre) = ·03937 inches = $\frac{1}{25}$ inch very nearly.

19 mm = ·748 inch = $\frac{3}{4}$ inch very nearly.	254 mm = 9·96 inches = $9\frac{24}{25}$ inches.
25 mm = ·984 " = 1 " " "	273 mm = 10·75 " = $10\frac{3}{4}$ "
38 mm = 1·496 " = $1\frac{1}{2}$ " " "	279 mm = 10·98 " = $10\frac{49}{50}$ "
47 mm = 1·85 " = $1\frac{17}{20}$ "	304 mm = 11·99 " = 1 foot very nearly.
51 mm = 2·0 inches = 2 inches.	305 mm = 12·01 " = rather more than 1 ft.
56 mm = 2·2 " = $2\frac{1}{5}$ "	318 mm = 12·52 " = rather more than $12\frac{1}{2}$ inches.
57 mm = 2·24 " = $2\frac{1}{4}$ " very nearly.	343 mm = 13·5 " = $13\frac{1}{2}$ inches.
63 mm = 2·48 " = $2\frac{1}{2}$ " " "	355 mm = 13·98 " = 1 foot 2 inches very nearly.
64 mm = 2·52 " = rather more than $2\frac{1}{2}$ inches.	356 mm = 14·01 " = rather more than 1 ft. 2 inches.
65 mm = 2·56 " = $2\frac{14}{25}$ inches.	385 mm = 15·16 " = $15\frac{1}{8}$ inches very nearly.
66 mm = 2·6 " = $2\frac{3}{5}$ "	387 mm = 15·23 " = $15\frac{1}{4}$ " " "
73 mm = 2·87 " = $2\frac{22}{25}$ " very nearly.	405 mm = 15·94 " = $15\frac{47}{50}$ "
75 mm = 2·95 " = 3 " " "	406 mm = 15·98 " = $15\frac{49}{50}$ "
100 mm = 3·937 " = 4 " " "	407 mm = 16·02 " = $16\frac{1}{50}$ "
101 mm = 3·976 " = 4 " " "	408 mm = 16·06 " = $16\frac{3}{50}$ "
102 mm = 4·015 " = rather more than 4 inches.	427 mm = 16·81 " = rather more than $16\frac{1}{2}$ inches.
114 mm = 4·45 " = $4\frac{1}{2}$ inches very nearly.	430 mm = 16·93 " = " " " $16\frac{9}{10}$ inches.
120 mm = 4·72 " = $4\frac{3}{4}$ " " "	431 mm = 16·97 " = $16\frac{49}{50}$ inches very nearly.
125 mm = 4·92 " = $4\frac{23}{25}$ "	437 mm = 17·2 " = $17\frac{1}{5}$ inches.
127 mm = 5 " = 5 "	456 mm = 17·95 " = $17\frac{19}{20}$ "
132 mm = 5·2 " = $5\frac{1}{5}$ "	457 mm = 17·99 " = 18 " very nearly.
152 mm = 5·98 " = 6 " very nearly.	482 mm = 18·98 " = $18\frac{49}{50}$ "
153 mm = 6·02 " = $6\frac{1}{50}$ "	483 mm = 19·02 " = $19\frac{1}{50}$ "
178 mm = 7 " = 7 "	507 mm = 19·96 " = $19\frac{24}{25}$ "
203 mm = 7·99 " = 8 " very nearly.	508 mm = 20·00 " = 20 "
205 mm = 8·07 " = $8\frac{2}{25}$ " " "	510 mm = 20·08 " = $20\frac{2}{25}$ "
228 mm = 8·98 " = $8\frac{49}{50}$ " " "	
229 mm = 9·02 " = $9\frac{1}{50}$ "	
234 mm = 9·21 " = rather more than $9\frac{1}{5}$ inches.	

Translation of the terms in the diagrams on page 257:

senkr. eis. Träger = vertical iron support—eis. Innenhaut = iron skin plating—Hinterlage
Teakholz = teakwood backing—Panzer = armour—Eisenblech = iron sheet—Hinterlage
Teakholz mit Längsträgern = teakwood backing with girders.

ABBREVIATIONS,

used in the following list of vessels:

b.	barbette.
bldg.	building.
B. L.	Breech Loader.
comp.	compound.
c. t.	conning tower.
H. P.	Horse Power.
H. S.	Harvey steel.
L.	light guns.
M.	Machine guns.
N. S.	Nickel steel.
pr.	pounder.
Q. F.	quick firing.
subm.	submerged.

THE BRITISH NAVY.

THE BRITISH

The ships are all built of steel with triple expansion engines and twin screws; (6080 ft.), reckoned at the rate of ten knots an hour; 16

[illegible]

NAVY.

the distance that can be run with the store of coals is indicated in nautical miles in reality it will probably be considerably less.

Armament			Torpedo Tubes Number	Boilers		H. P.	Speed in knots	Coals		Complement
Number	Kind	Calibre		Number	Kind			Store in tons	Distance in naut. miles at 10 knots	
$\left\{ \begin{array}{l} 4 \\ 10 \\ 15 \\ 12 \\ 8 \\ 2 \end{array} \right.$	Q. F. 12-pr. 3-pr. M. L.	$\left\{ \begin{array}{l} 13\cdot5 \\ 6\text{-in.} \end{array} \right.$	7 4 Broadside 2 Subm.	8	single-ended cylindr.	13,000	17·5	1,800	7,900	730
										740
										730
										730
										730
										730
										730
$\left\{ \begin{array}{l} 4 \\ 10 \\ 10 \\ 12 \\ 8 \\ 2 \end{array} \right.$	Q. F. 6-pr. 3-pr. M. L.	$\left\{ \begin{array}{l} 13\cdot5\text{-in} \\ 6\text{-in.} \end{array} \right.$	7 2 Subm.	8	single-ended cylindr.	13,000	17·5	1,800	7,900	730
$\left\{ \begin{array}{l} 4 \\ 10 \\ 8 \\ 12 \\ 7 \\ 2 \end{array} \right.$	Q. F. 6-pr. 3-pr. M. L.	$\left\{ \begin{array}{l} 10\text{-in.} \\ 4\cdot7 \end{array} \right.$	7 2 Subm.			13,163 13,214	18·5 18·51	1,240	9,700	606
										622
$\left\{ \begin{array}{l} 4 \\ 12 \\ 18 \\ 12 \\ 8 \end{array} \right.$	Q. F. 12-pr. 3-pr. M.	$\left\{ \begin{array}{l} 12\text{-in.} \\ 6\text{-in.} \end{array} \right.$	5 4 Subm.	8	single-ended cylindr.	12,000	17·5	2,200	7,600	757

Name and Class	When launched	Dimensions in feet and inches				Ship's Bottom	Armour			
		Length	Beam	Draught	Tonnage Displacement		Side	Bulkhead	Gun Position	Backing Deck plating
b. <i>Formidable</i> b. <i>Implacable</i> b. <i>Irresistible</i>	bldg.	400	75	26 ft. 9 in.	15,000	wood sheathed and coppered				
b. <i>Renown</i>	1895	380	72	26 ft. 9 in.	12,350		8—6 H. S.	10—6 H. S.	10 H. S.	3—2
b. <i>Albion</i>	1895	390	74	25 ft. 5 in.	12,950		8 H. S.	6 H. S.	12—5 H. S.	3—2
b. <i>Glory</i>	bldg.	390	74	25 ft. 5 in.	12,950		6 H. S.	12 H. S.	12—5 H. S.	3—2
b. <i>Canopus</i>	bldg.	390	74	25 ft. 5 in.	12,950		6 H. S.	12 H. S.	12—5 H. S.	3—2
b. <i>Goliath</i>	bldg.	390	74	25 ft. 5 in.	12,950		6 H. S.	12 H. S.	12—5 H. S.	3—2
b. <i>Ocean</i>	bldg.	390	74	25 ft. 5 in.	12,950		6 H. S.	12 H. S.	12—5 H. S.	3—2
b. <i>Anson</i>	1889	330	68 ft. 6 in.	27 ft. 3 in.	10,600		18 Comp.	16 Comp.	14—12 Comp.	10—15 3—2 $\frac{1}{8}$
b. <i>Benbow</i>	1888	330	68 ft. 6 in.	27 ft. 3 in.	10,600		18 Comp.	16 Comp.	14—2 Comp.	12—15 3—2 $\frac{1}{8}$

Armament			Torpedo Tubes Number	Boilers		H. P.	Speed in knots	Coals		Complement
Number	Kind	Calibre		Number	Kind			Store in tons	Distance in naut. miles at 10 knots	
4 12 18 12 8	B. L. Q. F. 12-pr. 3-pr. M.	12-in. 6-in.	— 2 2			15,000	18	9,00		750 755 755
4 10 14 12 7 2	29 ton. Q. F. 12-prs. 3-prs. M. L.	10-in. 6-in.	5 4 subm.	8	single-ended cylindr.	12,900	18-75	1,600	12,000	674
4 12 18 2	Q. F. Q. F. smaller L.	12-in. 6-in.	5 4 subm.	20	Belleville	13,500	18-25	1,850		700
4 12 18 2	Q. F. Q. F. smaller L.	12-in. 6-in.	5 4 subm.	20	Belleville	13,500	18-25	1,850		700
4 12 18 2	Q. F. Q. F. smaller L.	12-in. 6-in.	5 4 subm.	20	Belleville	13,500	18-25	1,850		700
4 12 18 2	Q. F. Q. F. smaller L.	12-in. 6-in.	5 4 subm.	20	Belleville	13,500	18-25	1,850		700
4 12 18 2	Q. F. Q. F. smaller L.	12-in. 6-in.	5 4 subm.	20	Belleville	13,500	18-25	1,850		700
4 6 12 10 7 2 2 10 16 7 2	Q. F. 6-pr. 3-pr. M. L. Q. F. 3-pr. M. L.	13-5 in. 6-in.	5			11,500	16-9	1,200		515
		16-25 in. 6-in.	5			11,500	16-75	1,200		509

Name and Class	When launched	Dimensions in feet and inches				Ship's Bottom	Armour			
		Length	Beam	Draught	Tonnage Displacement		Side	Bulkhead	Gun Position	Backing Deck plating
b. <i>Camperdown</i>	1889	330	68 ft. 6 in.	27 ft. 3 in.	10,600		18 Comp.	16 Comp.	12 Comp.	10—15 3—2½
b. <i>Collingwood</i>	1886	325	68	26 ft. 10 in.	9,500		18 Comp.	16 Comp.	12 Comp.	17—10 2½
b. <i>Howe</i>	1889	325	68	27 ft. 3 in.	10,300		18 Comp.	16 Comp.	11½ Comp.	15—12 3—2½
b. <i>Rodney</i>	1888	325	68	27 ft. 3 in.	10,300		18 Comp.	16 Comp.	11 Comp.	15—12 3—2½
t. <i>Trafalgar</i>	1890	345	73	27 ft. 6 in.	11,940		20—16 Comp.	18—14 Comp.	18 Comp.	6 3
b. <i>Vengeance</i>	bldg.	390	74	26	12,950		6 H. N. S.	12 H. N. S.	12—6 H. S.	4 2—1
t. <i>Nile</i>	1890	345	73	27 ft. 6 in.	11,940		20—16 Comp.	18—14 Comp.	18 Comp.	6 3
t. <i>Sans pareil (iron)</i>	1889	340	70	27 ft. 3 in.	10,470		16—18 Comp.	16 Comp.	18 Comp.	6 3

Number	Armament		Torpedo tubes Number	Boilers		H. P.	Speed in knots	Coals		Complement
	Kind	Calibre		Number	Kind			Store in tons	Distance in naut. miles at 10 knots	
4 6 12 10 7 2	Q. F. 6-pr. 3-pr. M. L.	13.5-in. 6-in.	4			11,500	16.9	1,200		515
4 6 12 8 6 4	Q. F. 6-pr. 3-pr. M. L.	12-in. 6-in.	4			9,500	16.5	1,200		480
4 6 12	5 ton. 6-pr. Q. F.	13.5-in. 6-in.	1			11,500	16.8	1,200		515
10 7 2 4 6 12 10 6 2	3-pr. M. L. Q. F. 6-pr. 3-pr. M. L.	13.5-in. 6-in.	4			11,500	16.75	1,200		515
4 6 8 12 6 3	Q. F. 6-pr. 3-pr. M. L.	13.5-in. 6-in.	6 2 Subm.			12,000	16.7	1,200		572
4 12 12 18	B. L. Q. F. 12-prs. smaller guns	12-in. 6-in.				13,500	18.25	800		750
4 6 8 12 7 3	Q. F. 6-pr. 3-pr. M. L.	13.5-in. 4.7-in.	6 2 Subm.			12,000	16.7	1200		558
2 1 12 12 8 2	Q. F. 6-pr. 3-pr. M. L.	16.25-in. 10-in. 6-in.	6 2 Subm.			14,000	17.2	1200		583

Name and Class	When launched	Dimensions in feet and inches				Ship's Bottom	Armour	
		Length	Beam	Draught	Tonnage Displace- ment		Gun Position	Deck
B) First Class Cruisers								
<i>Andromeda</i>	1890	435	69	25 ft. 3 in.	11,000	wood sheathed and coppered	4½	3—6
<i>Argonaut</i>	1897	435	69	25 ft. 3 in.	11,000	ditto	3—6 H. S.	4 in.
<i>Ariadne</i>	bldg.	435	69	25 ft. 3 in.	11,000	ditto	3—6 H. S.	4 in.
<i>Amphitrite</i>	1897	435	69	25 ft. 3 in.	11,000	ditto	3—6 H. S.	4 in.
<i>Blake</i>	1889	375	65	25 ft. 9 in.	9,000	ditto	6	6—3
<i>Blenheim</i>	1890	sister-ship to Blake in every respect.						
<i>Crescent</i>	1892	360	60	23 ft. 9 in.	7,700	wood sheathed and coppered	6	5—1
<i>Diadem</i>	1896	435	69	26 ft.	11,000	ditto	4½	3—6
<i>Edgar</i> <i>Endymion</i>	1890 } 1891 }	360	60	23 ft. 9 in.	7,350	ditto	6	5—1
<i>Europa</i>	1897	435	69	26 ft.	11,000	ditto	4½	4

Armament			Torpedo Tubes Number	Boilers		H. P.	Speed in knots	Coals		Complement
Number	Kind	Calibre		No.	Kind			Store in Tons	Distance in naut. miles at 10 knots	
16 14 12 2	12-pr. 8-pr. 12-pr. boat	6-in.	3 2 Subm.	30	Belleville	16,500	20·5	2,000	?	600
16 14 12 2	Q. F. 12-pr. 8-pr. 12-pr. boat	6-in.	3 2 Subm.	30	Belleville	18,000	20·75	1,000	?	677
see Argonaut			3 2 Subm.	30	Belleville	18,000	20·75	1,000	?	677
ditto			3 2 Subm.	30	Belleville	18,000	20·75	1,000	?	309
2 10 16- 7 2	Q. F. 8-pr. Q. F. M. L.	9·2 in. 6-in.	4 2 Subm.	?	?	20,000	21·5	1,500	?	570
1 12 12 5 7 2	Q. F. 6-pr. 8-pr. M L	9·2 in. 6-in.	4 2 Subm.	6	double-end. cylindr.	12,000	19·7	1,260	14,000	560
16 14 12 2	Q. F. 12-pr. 8-pr. 12-pr. boat	6-in.	3 2 Subm.	30	Belleville	16,500	20·25	2,000	?	600
2 10 12 5 7 2	Q. F. 6-pr. 8-pr. M L	9·2 in. 6-in.	4 2 Subm.	6	double-end. cylindr.	12,000	20	12,000	?	544
16 14 12 7 2	Q. F. 12-pr. 8-pr. M L	6-in.	3 2 Subm.	30	Belleville	16,500	20·25	2,000	?	600

Name and Class	When launched	Dimensions in feet and inches				Ship's Bottom	Armour	
		Length	Beam	Draught	Tonnage Displacement		Gun Position	Deck
<i>Gibraltar</i>	1892	360	60	23 ft. 9 in.	7,700	wood sheathed and coppered	6 in.	5—1
<i>Grafton</i>	1892	360	60	23 ft. 9 in.	7,350	—	6	5—1
<i>Hawke</i>	1891	sister-ship to Grafton in every respect except complement.						
<i>Niobe</i>	1897	435	69	26	11,000	wood sheathed and coppered.	4½	3—6
<i>Powerful</i>	1895	500	71	29	14,200	ditto	6	3—6
<i>Royal Arthur</i>	1891	360	60	27 ft. 9 in.	7,700	ditto	6	5—1
<i>St. George</i>	1892	360	60 ft. 8 in.	23 ft. 9 in.	7,700	ditto	6	5—1
<i>Spartiate</i>	bldg.	435	69	26	11,000	ditto	4½	3—6
<i>Terrible</i>	1895	500	71	27	14,200	ditto	6	3—6

Armament			Torpedo Tubes Number	Boilers		H. P.	Speed in Knots	Coals		Complement
Number	Kind	Calibre		No.	Kind			Store in Tons	Distance in naut. miles at 10 knots	
see Edgar			4 2 Subm.	6	double-end. cylindr.	12,000	20	1200	?	544
see Edgar			4 2 Subm.	6	double-end. cylindr.	12,000	20	1200	?	560
16 14 12 7 2	Q. F. 12-pr. 3-pr. M L	6-in.	3 2 Subm.	30	Belleville	16,500	20-25	2,000	?	544 600
2 12 18 12 9 2	Q. F. 12-pr. 3-pr. M L	9-2 in. 6-in.	4 2 Subm.	48	Belleville	25,000	22	3,000	25,000	894
1 12 12 5 7 2	Q. F. 6-pr. 3-pr. M L	9-2 in. 6-in.	4 2 Subm.	6	double-end. cylindr.	12,000	19-5	1260	14,000	567
2 10 12 5 7 2	Q. F. 6-pr. 3-pr. M L	9-2 in. 6-in.	4 2 Subm.	6	double-end. cylindr.	12,000	19-5	1260	14,000	559
16 14 12 2	Q. F. 12-pr. 3-pr. 12 pr. boat	6-in.	3 2 Subm.	30	Belleville	16,500	20-75	1000	?	600
2 12 18 9 2	Q. F. 12-pr. M 12-pr. boat	9-2 in. 6-in.	4 2 Subm.	48	Belleville	25,000	22-4	8000	25,000	894

Name and Class	When launched	Dimensions in feet and inches				Ship's Bottom	Armour	
		Length	Beam	Draught	Tonnage Displacement		Gun Position	Deck
<i>Eclipse</i> ¹ <i>Minerva</i> ² <i>Talbot</i>	1894 1895 1895	} 350	53 ft.	20 ft. 6-in. 20 ft. 6-in. 21 ft.	5600	wood sheathed and coppered	4 ¹ / ₂	1 ¹ / ₂ —3
<i>Diana</i> <i>Dido</i> <i>Doris</i>	1895 1896 1896	} 350	54 ft.	21 ft.	5600	ditto	4 ¹ / ₂	2 ¹ / ₂
<i>Isis</i> <i>Juno</i>	1896 1895	} 350	54 ft.	21 ft.	5600	ditto	4 ¹ / ₂	2 ¹ / ₂
<i>Venus</i>	1895	350	54 ft.	21 ft. 2-in.	5600	ditto	4 ¹ / ₂	2 ¹ / ₂
<i>Arrogant</i>	1896	320	57 ft. 6-in.	21 ft.	5800	—	4 ¹ / ₂	1—2
<i>Furious</i> <i>Gladiator</i>	} 1896	320	57 ft. 6-in.	22 ft.	5800	wood sheathed and coppered	4 ¹ / ₂	1—2
<i>Vindictive</i>	1896	320	57 ft. 6-in.	20 ft. 6-in.	5800	—	4 ¹ / ₂	1—2
<i>Hermes</i> <i>Highflyer</i> <i>Hyacinth</i>	} bldg.	350	54 ft.	21 ft.	5600	wood sheathed and coppered	4 ¹ / ₂	1 ¹ / ₂ —3

In addition to the above there are 13 Second-Class Cruisers built between 1868 and 1886, and 6,000). Nine are of steel with twin screws, four of iron with single screws.

¹ 12-pr. boat.

² 1 L.

Armament			Torpedo Tubes Number	Boilers		H. P.	Speed in knots	Coals		Complement
Number	Kind	Calibre		No.	Kind			Store in Tons	Distance in naut. miles at 10 knots	
5 6 9 1 4	Q. F. 12-pr 3-pr. M	6-in 4·7 in.	3 2 Subm.	8	single-end.	9,600	19·5	1000	?	437
5 6 9 1 4 1	Q. F. 12-pr. 3-pr. M 12-pr. boat	6-in. 4·7 in.	3 2 Subm.	8	single-end.	9,600	19·5	1076	?	450
			4 2 Subm.	8	single-end.	9,600	19·5	1076	?	450
5 6 8 7 4 1	Q. F. 12-pr. 3-pr. M 12-pr. boat	6-in. 4·7 in.	3 2 Subm.	8	single-end.	9,600	19·5	1076	?	450
4 6 9 3 5 1	Q. F. 12-pr. 3-pr. M 12-pr. boat	6-in. 4·7 in.	2 Subm.	18	Belleville	10,112	19·5	400	?	480
4 6 8 3 5 1	Q. F. 12-pr. 3-pr. M 12-pr. boat	6-in. 4·7 in.	2 Subm.	18	Belleville	10,000	19	500	?	480
			2 Subm.	18	Belleville	10,000	19·5	500	?	450
11 15	Q. F. Q. F. smaller	6-in.	?	?	?	10,000	20	550	?	477

with tonnage varying from 3,080 to 5,600, and H. P. from 2,400 to 6,000 (mostly between 5,000

Number	Armament		Torpedo Tubes Number	Boilers		H. P.	Speed in knots	Coals		Complement
	Kind	Calibre		No.	Kind			Store in Tons	Distance in naut. miles at 10 knots	
8 8 4 1	Q. F. 3-pr. M L	4.7 in.	4 4 2 2			7,500	19	440	6,000	217
8 8 2	Q. F. 3-pr. L	4 in.	2	8	Water tube	7,000	20	250	7,000	224

onnage and H. P. vary between 1400 and 9000. Four of these have a composite—twenty-four are propelled by twin screws, the rest by single screws. The four

									Radius of Action in Miles	
1 6	B. L. Q. F.	4 in. $1\frac{3}{4}$ in.	4	4	Locomotive	2700	19	80	2,400	63
2 4	Q. F. Q. F.	$4\frac{3}{4}$ in. $1\frac{3}{4}$ in.	5	—	Water tube	3500	19	160	3,200	91
2 4	Q. F. Q. F.	$4\frac{3}{4}$ in. $1\frac{3}{4}$ in.	3	—	Locomotive	3500	$19\frac{1}{4}$	100	2500	85
2 4	Q. F. Q. F.	$4\frac{3}{4}$ in. $2\frac{1}{4}$ in.	5	—	Locomotive	3500	$18\frac{1}{2}$	100	2500	115

Name and Class	When launched	Dimensions in feet and inches				Ship's Bottom	Armour	
		Length	Beam	Draught	Tonnage Displacement		Gun Position	Deck
F) <i>Torpedo-boat destroyers</i>								
		Ninety to a hundred vessels of the "Havock", "Hornet", "Griffon", and						
<i>Havock</i>	1893	180	18 ft. 6 in.	5 ft. 3 in.	240		—	—
<i>Hornet</i>	1893	180	18 ft. 6 in.	5 ft. 3 in.	240		—	—
<i>Griffon</i>	1896	200	20 ft.	5 ft. 3 in.	300		—	—
<i>Express</i>	1897	227 ft. 7 in.	22 ft.	9 ft.	300		—	—

To these Lists must be added the vessels named in the additional programme and 12 Torpedo-boat destroyers.

¹ Many of these are now completed.

Armament			Torpedo Tubes Number	Boilers		H. P.	Speed in knots	Coals		Complement
Number	Kind	Calibre		No.	Kind			Store in Tons	Distance in naut. miles at 10 knots	
"Express" type are building. ¹										
1	12-pr. Q. F.	3 in.	3	—	Locomotive	3,500	26·77	57	—	43
3	Q. F.	2¼ in.								
1	12-pr. Q. F.	3 in.	3	--	Locomotive	4,000	27·3	—	—	—
5	6-pr. Q. F.	2¼ in.								
1	12-pr. Q. F.	3 in.	2	—	—	6,000	30·11	58	—	80
5	6-pr. Q. F.	2¼ in.								
1	12-pr. Q. F.	3 in.	2	—	—	7,700	33	80	—	60
5	6-pr. Q. F.	2¼ in.								

of Mr. Goschen's Supplementary Estimate: 4 more battle-ships, 4 more cruisers,

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